Contractors and Engineers Monthly

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Highlights Of This Issue

- **Special Forms for Sea Wall**
  To protect Tampa, Fla., from the disastrous effects of bad storms, a new 8,800-foot sea wall of unusual design was recently completed. The special forms and concrete block spacers are described in detail.
  See page 2.
- **High Overpass Over Railroad**
  The construction features of a high overpass to carry U. S. 5 over the Boston & Maine Railroad just north of Newbury, Vt., are described in this issue.
  See page 2.
- **Albemarle Sound Bridge**
  A 3.5-mile bridge of the composite type, consisting of creosoted timber substructure and a steel beam and concrete deck, involving unique structural details, was recently constructed across Albemarle Sound in North Carolina.
  See page 5.
- **Concrete Paving in South Carolina**
  The methods of construction of a 7,544-mile two-lane highway, with boulevard strip between lanes, entering Charleston, S. C., from the northwest are described.
  See page 11.
- **Principles for County Road Work**
  The application of sound business methods to county highway work is urged by a New York county highway superintendent who describes how such methods have brought more and better roads to his county.
  See page 17.
- **Airport Runways**
  Experiments to determine a satisfactory seal for the tar mixed-in-place runways were carried on at Malcolm McKinnon Field, the 375-acre airport of Glynn County, Ga.
  See page 21.
- **Planning Road for Future**
  The opening of 9 miles of new highway on a 1,000-foot right-of-way in New Hampshire is described in this issue.
  See page 33.

IN THIS ISSUE

Multnomah County's Rotoblade Mounted on a 4 to 5-Ton FWD Truck at Work Near Larch Mountain Last Winter, Clearing the Highway and Throwing Snow Off the Shoulder in One Operation

Clearing Highways In Oregon County

Occasional "Hard" Winters Tax Road Organization of Multnomah County Where Climate Is Normally Mild

By HENRY W. YOUNG

✦ SNOW removal problems do not tax county road organization resources in uniformly severe climates more than they do in those regions normally mild but subject to intermittent and unpredictable hard winters. In this classification is Multnomah County in Oregon. The Roadmaster there is not a weather prophet and even the Weather Bureau congratulates itself on a 50 per cent batting average on "short haul" prophesies. As to seasonal possibilities, everybody is in the dark. For two or three years at a stretch it may not be necessary to get out any of the snow-fighting equipment over most of the county. Then comes a winter, like the one of 1936-37, when every available piece of equipment is put to work and it may be two or three days before all roads can be opened.

Several kinds of snow and snow storms may occur on very short notice. The eastern end of the county is in the foothills of Mt. Hood. Some snow can be counted on there every season. The Columbia River Gorge, on the north and east, is the toughest spot when snow does come. High winds from eastern Oregon bring snow there under blizzard conditions. Sometimes it is "tapioca" snow, coarse, hard ice particles that will roll, slide, drift and pile themselves up to 20 or 30 feet deep in places, and the more such stuff is excavated, the more it tends to come sliding in. Around Portland and to the west end of the county, there is a slightly different climate. Precipitation in winter is usually rain but if the temperature drops a few degrees,

(Continued on page 18)

Louisiana Methods Of Retread Paving For Old Highways

A Complete Cold-Mix Plant Assembled; New Spreader Screeds and Tamps Leveling And Surface Courses

✦ THE Louisiana Highway Commission decided that a readily portable retread plant should be assembled for mixing and applying a suitable smooth surface over the rough surfaces that have developed on some of the main highways. The first maintenance-construction project for this newly created unit consisted of nearly 7 miles of retread between Raceland and Midway on U.S. 90 about 50 miles west of New Orleans. This portion of road is through a marshy section where the water remains at the toe of the slope throughout the year. Work started at the end of February and was completed at the end of April, 1938. It is expected that the next project on the same highway east of New Orleans will operate much more rapidly as the experimental work on the first one has established a basis for future work of this type.

The Plant

The plant consists of a Barber-Greene tamping-leveling-finishing machine and a Barber-Greene mixing plant for the production of the retread material near the job. In this manner it is expected that the advantages of a plant mix with pre-heating of the materials and the uniform spreading of the mix on the road surface will be combined in a readily mobile plant that can be used all over the state.

The aggregates were stockpiled at a convenient point east of Raceland where a railroad siding was available. A Lorain 30 with a Blaw-Knox ½-yard clamshell fed the aggregates, which had been previously sized at the plant of the commercial producer to meet the specifications for the mix, to an elevated hopper from which they dropped by gravity into the end of a 20-foot x 42-inch diameter drier heated by a single fuel-oil torch and turned by a McCormick-Deering farm tractor. The dried material was raised by a bucket elevator to the hopper at the top of the mixing unit. The machine was operated by a Buda engine which drove the 36-inch wide metal conveyor which measured the flow of aggregates beneath a pair of adjustable calibrated gates as well as the metered asphalt pump which was set to deliver the predetermined amount of asphalt for the mix as a continuous operation. The aggregates and cut-back asphalt were mixed in a pugmill before delivery to the trucks at the end of the machine.

The 85 per cent cut-back asphalt was delivered to the site by the oil companies in tank cars and heated to 175 degrees in the car by a M. Rumley Co. horizontal steam boiler using a fuel-oil torch. The transfer of the asphalt from the car to the plant was done with a Kinney asphalt pump and a second metering pump was used on the plant itself for delivery to the pugmill. The steam boiler was started with wood and then as soon as steam was available it was used for vaporizing the fuel oil for the torches as well as for heating the tank car. The cut-back asphalt used on this project was an RC4 and when it was

(Continued on page 13)

DUAL-DRUM PAVER POURS DUAL-LANE ROAD

C. & E. M. Photo

The Big Ransome Dual Drum Paver Pouring the Connecting Curve at the Northwest End of the Dual-Lane Entrance to Charleston, S.C. See Page 11.

Construction Features Of New Tampa Sea Wall

Remarkable Design and Novel Aids to Accurate Work Make This Florida WPA Project of Interest to Contractors

(*Photos on page 36*)

✦ A DESIGN that throws back the 2-ton per square foot impact of waves with only a 13-inch thickness of wall and curved forms built with wood trusses so that they were as good at the end of 8,800 feet of wall as when first placed in service are but two of the engineering design and construction features of the new sea wall at Tampa, Fla., constructed to replace a gravity-type wall built in 1907, somewhat undermined in 1921, and seriously damaged by the backwash of the Florida hurricane of 1935 which swept the Florida Keys so disastrously. The attacks of the teredo on the supporting piles, which were exposed to the salt tides as the surrounding fill was washed away, completed the havoc.

A WPA project was set up in the fall of 1935 for the construction of a 5,000-foot wall and was approved. Later extensions to the east and west, making a total length of 8,300 feet, were approved, including new double drives on Bayshore Boulevard, each with two lanes and a parking lane, comprising an $800,000 project of real value to the city and its property owners.

Design of the Wall

The wall design is a compromise semi-gravity type wall with a lower section at 45 degrees with the vertical to dissipate the waves and an upper section curving outward in the form of a parabola composed of multi-center curves to throw the waves outward and back onto the oncoming waves to dissipate their energy. The top of the wall is 5½ feet above mean low water. At the base the toe, 21 inches high and 36 inches deep, is cast on a continuous vertical cut-off wall of interlocking steel sheet piling.

Swinging a No. F1 Front Form Panel into Place

The wall has an average thickness of 13 inches and a cross sectional area of only 24 feet while the best design for a gravity section would have required 41 square feet. The wall is supported on two rows of untreated piles 6 feet apart with one row under the toe and the other under the rear line of the wall. These piles played an important part in the support of the forms during construction and are designed for both horizontal and vertical loads when the wall is under stress from wave action. The two lines of piles are cross-braced with a pair of 8-inch round struts for each pair of piles securely bolted with 1-inch machine bolts. Beneath these, as temporary shores during construction, were 6 x 10's on both sides of the piles, carrying the weight of the forms and the concrete. The sea wall section as well as the complete framing of the forms are shown in one of the accompanying illustrations taken from the working drawings of the project.

Expansion joints were inserted every 102 feet with premoulded filler ¾ inch thick and the joint backed by a strip of sheet copper to keep the backfill from getting into the joint and preventing its fulfilling its function.

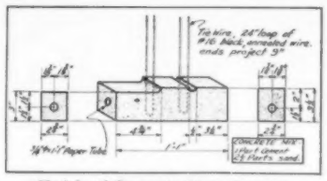
The design of the reinforcing for the wall was simplified by the fact that the designing engineer had a sufficient knowledge of construction procedure to permit him to aid the laborers to insure the exact placing of the steel. In this manner the reinforcing was only 41 pounds per foot of wall or 46 pounds per cubic yard of concrete. In a standard design 100 per cent in accordance with reinforced concrete methods and allowing the usual factors of safety for the misplacement of the steel, the design would have required 105 pounds of steel per cubic yard of concrete. How the proper placement was accomplished will be discussed later under "Forms".

Construction

The location of the sea wall in 5 feet of water required the use of a steel sheet piling cofferdam. Study of the job and the need for the re-use of the sheet piling several times during the project showed that 22-foot piling would be the most economical. Carnegie M-115 piling weighing 22 pounds per square foot was ordered for the first five 102-foot units of sea wall and then a further order was placed for one additional unit.

Driving of the first cofferdam began on March 7, 1936 with a McKiernan-Terry 7B steam hammer. This was preceded by the driving of the bearing piles with a 2,500-pound drop hammer mounted on a 20 x 50-foot barge. The cofferdam had a top elevation of plus 7, the excavation within the cofferdam was carried down to minus 7 and the bottom of the steel was at minus 15. The cofferdam was braced with but one line of waling.

The following sequence of operations in the construction of one unit of sea wall was furnished by W. E. Robinson, WPA Chief Engineer.



Sketch of Concrete Form Spacers

1. Drive bearing piles
2. Attach guide wales for driving cofferdam sheeting
3. Drive cofferdam
4. Install cofferdam wales
5. Unwater cofferdam
6. Excavate cofferdam to elevation minus 7
7. Cut off bearing piles to grade and attach transverse truss timbers
8. Drive cut-off wall piling
9. Set bottom and back forms, supported on transverse truss timbers
10. Place spreader blocks and tie up steel reinforcement
11. Set front forms and brace up
12. Pour concrete
13. Extract form tie bolts after 7 hours, and in 24 hours remove front form panels
14. Finish front wall
15. Cure concrete 7 days
16. Strip bottom forms
17. Pull cofferdam

As there was sufficient steel sheet piling for six complete 102-foot cofferdams, the construction of the wall was placed on a real production schedule of 18 days for the cycle from driving to pulling the coffer. The time schedule was as follows:

Driving one cofferdam	2 days
Mucking and driving cut-off wall	2 days
Setting forms and steel	4 days
Pouring concrete	1 day
Curing concrete	7 days
Stripping forms	1 day
Pulling piling	1 day
Total	18 days

This schedule prepared by Mr. Robinson made it possible to use the cofferdam piling 1 1/3 times in each 24-day working month, permitting a production of 800 feet of wall per month.

Forms and Spacer Blocks

The wood forms were a marvel of

(*Continued on page 8*)

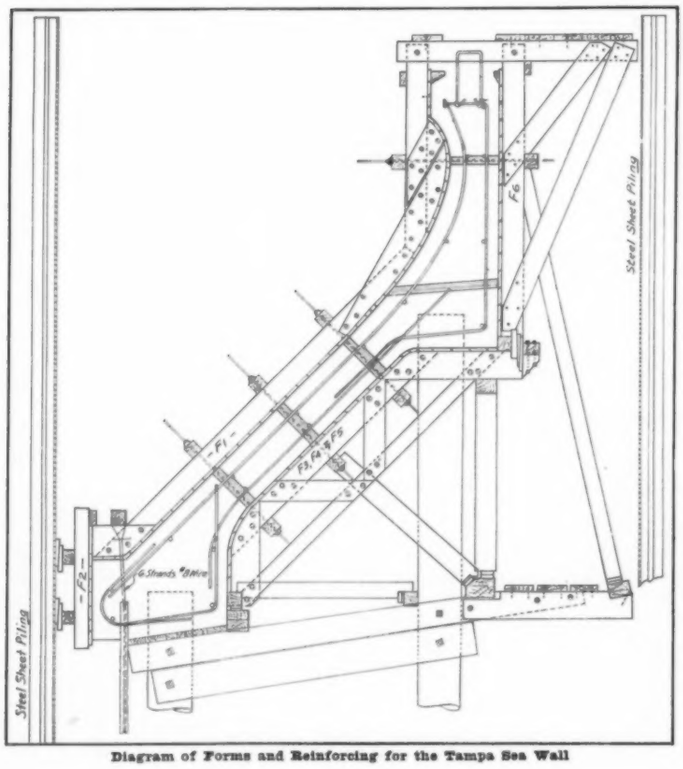


Diagram of Forms and Reinforcing for the Tampa Sea Wall

Vermont Highway On High Overpass

Contractor Built Concrete Runways Above Structure At Sharp Angle Over B & M Railroad

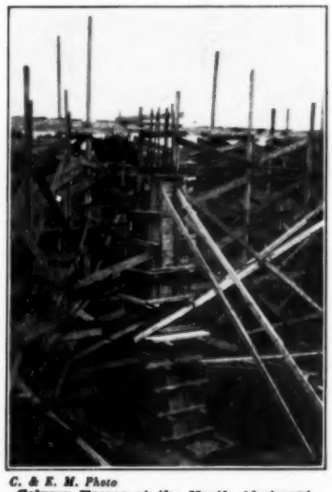
✦ JUST north of Newbury, Vt., the State Highway Department has removed a hazardous grade crossing where U.S. 5, a main north and south artery to Canada, descends a steep grade and crosses the Boston & Maine railroad at a sharp angle. Ice on the highway in winter makes this a sore spot so that the construction of a high overpass taking off from well up on the hill and crossing the railroad at a 68-degree angle was decided upon and a contract for its construction awarded to Ryan & Densmore during the summer of 1937.

Design of Structure

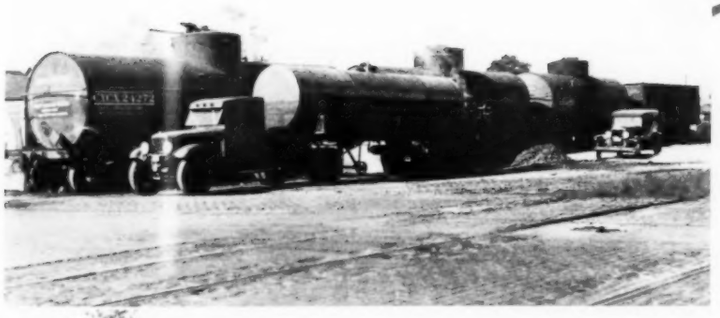
The overpass structure consists of two open abutments with three columns and four piers of five columns each, making a 5-span structure. The abutments have 8 x 19-foot footings 2 feet thick with heavy rod reinforcing on 6-inch centers. The abutment columns are 2 feet thick and 13 feet wide at the bottom, reducing to 4 feet 4½ inches at a height of 11 feet above the footing. Then for the balance of the height, 14 feet 2 inches, they reduce uniformly to 2 feet at the top with a vertical face and a 2 on 12 batter in front. At the top is a 3 x 3-foot fillet supporting the beam. The vertical reinforcing in the abutment columns consists of eight 1¼-inch bars, with ¼-inch hoops.

The five-column piers supporting the 64-foot spans have separate spread footings for each column, and the columns are battered. All of the pier columns are the same except for the height which varies from 23 feet 9¾ inches to 29 feet 4 inches. The columns are spaced 16 feet 3/16 inches center to center in the piers and 27 feet 6 inches in the abutments. The pier columns measure 2 x 2 feet at the top with 2 x 2-foot fillets and they are designed with a batter of ⅛ inch in 12 inches on two sides and ¼ inch in 12 inches front and back. The piers are carried on footings 8 feet 6 inches x 9 feet 6 inches and 2 feet thick. Because of the skew the concrete caps for the 64-foot span are 74 feet ¾ inch long. This cap is 2 feet 6 inches high and 3 feet 8 inches wide with a 12 x 2-inch coping front and back. The skew of the structure and a descending grade of nearly 6 per cent have another annoying effect in that they make the I-beams lose grade. The compensation for this is in stepping the column cap so that it is higher on one side. This difference

(*Continued on page 30*)



C. & E. M. Photo
Column Forms at the North Abutment



CHOICE OF CONTRACTORS

who are

"going places"

CONSTRUCTING LOW-COST PLANT-MIX TEXACO ASPHALT SURFACE ON STATE AID ROUTE 10 IN OGLE AND WHITESIDE COUNTIES, ILLINOIS

(Top photo) Unloading TEXACO SC Surfacing Material No. 8 from tank-cars into portable tank for delivery to asphalt plant.

(center) Applying plant-mix of SC-8 and gravel to half road at a time.

(bottom) Completed surface ready for seal coat.

Watch street and highway contractors who are really moving ahead. We mean contractors who not only get jobs, but, because they know their business so thoroughly, employing methods and materials of the highest standard, make a satisfactory profit as well.

Note how many contractors in this class are TEXACO Asphalt users. To them, it is an important fact that TEXACO Asphalt has been used by paving contractors from the Atlantic to the Rockies for a third of a century. To them, this fact is the best proof one could ask of products, service and an organization, which are 100 per cent dependable.

Send for a Texaco Field Man to discuss your Asphalt requirements with you.

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Hurricane Emergency Met Promptly

During the severe storm which devastated large areas along the northeastern coast of this country on September 21, and on the three following days, we drove nearly 1,000 miles through southern New York, Connecticut, Rhode Island and Massachusetts. The damage to personal property was tremendous and losses in most instances impossible of redemption. But it is the public loss, the damage to highways and bridges and other transportation facilities, and the speedy resumption of these services with which we are concerned.

Thursday the only means of transportation between Boston and New York was by water or by air. Early Friday morning the Connecticut Highway Department had opened U. S. 1 from the New York State line to New London, and Connecticut Route 84 to Hopkinton, R. I., although cabin cruisers, houses and fallen trees still blocked some sections, making one-way traffic necessary. Telephone and power company crews aided state forces in the removal of trees, many of which were prevented from blocking highways solely because they were supported by the wires of the utilities. Laboring throughout daylight and through the night, with fire-engine searchlights and other means illuminating the roads or the tops of poles, town, state and utility crews of faithful workers to whom emergency means work around the clock had cleared the full width of U. S. 1 by Sunday night, September 25. Only those sections most badly stricken along the very rim of the coast, or inland where the great Connecticut River continued in flood, were forbidden to through traffic. In those places state militia, aided by local residents hastily sworn in as special police, kept all but known residents, property owners and the Press from these areas. Boy Scouts were invaluable aids in relieving exhausted police and militia in villages and cities. The raised hand of a lad in a Boy Scout hat and kerchief stopped lines of cars as effectively as the most experienced State Trooper.

It is interesting to note that the City of Providence, R. I., where a tidal wave placed the lowest section of the city under 22 feet of water for four hours and where the network of power lines was so swept away by the falling trees that for three days and nights there was no power for lights in homes, or for traffic or street lights, had no traffic accidents during that time. Disaster and emergency place every man on his metal to do his bit or his great service for the community. Only the "jackals of the storm" the looters, for whom "shoot on sight" orders were issued, marred the unity of endeavor in the service of humanity.

Aid came to utilities in Connecticut and Rhode Island from as far away as Pittsburgh, as several emergency crews of the Duquesne Light & Power Co. were seen cutting away trees and repairing lines. Last and not least was the miracle of America, the Red Cross, whose workers appeared everywhere as if by magic to succor those in need.

The total damage in these states is estimated at $400,000,000. For the repair of highways, bridges and public buildings, the New England governors seek $75,000,000 from the Federal government. Of this $25,000,000 is needed by Rhode Island, the hardest-hit state of all. Within a few days of the hurricane, 110,000 WPA workers were assigned to the task of clearing away debris and an additional 100,000 soon took up the task. CCC boys aided immediately after the "blow" and continued their aid through the trying days that followed.

Our praise goes to all in Massachusetts, Rhode Island, Connecticut and New York for the great work in restoring the transportation facilities to normal with speed and efficiency.

New Order for Bidders On Kentucky Road Work

All prospective bidders on state highway work in Kentucky must qualify under the Kentucky pre-qualification law before they bid on highway work, and prospective bidders who do not reside or have their main offices in Kentucky may not qualify for more work in Kentucky than the limit of qualification for a Kentucky contractor in their respective states, according to a recent official order from the Department of Highways.

Bids will be taken and awards made to out-of-state contractors on all highway work in Kentucky on the same basis that bids are taken and highway contracts are awarded to Kentucky contractors in the state from which the out-of-state contractor is bidding.

A.R.B.A. Proceedings

The Proceedings of the Thirty-Fifth Annual Convention of the American Road Builders' Association held last January in Cleveland has recently been published. This volume, which is free to A. R. B. A. members, contains all papers and discussions on the various problems confronting those concerned with better, safer highways.

Copies may be secured by non-members of the Association direct from the American Road Builders' Association, National Press Bldg., Washington, D. C. Price: $10.00.

"Come on, Gracie, Let's Go. This Is Where We Came In!"

New Route to the Sea Planned for Colombia

An arrangement has been completed by the National Government of Colombia, South America, and the Department of Antioquia for the construction of a "route to the sea," continuing the existing road from Medellin to the Caucao Valley on the Gulf of Uruba, where it is planned to construct a port. This road will eventually tie in with the Pan-American Highway which will some time be constructed from Panama City to the frontier of Colombia. With the completion of this new route to the sea and another highway from the town of Sonson in Antioquia to Honda in Tolima, there will be for the first time a direct route entirely in Colombia between Bogota, the capital, and the sea.

It is estimated that the cost of the construction of this new road will be 2,000,000 pesos or about $3,600,000. Work will begin at once and it is anticipated will be completed within a year. The Antioqueno Government will finance the construction of the road but will be repaid by the National Government in six quarterly installments of 33,333.33 pesos for two years, reports the U. S. Bureau of Foreign and Domestic Commerce.

Unusual Bridges in a Bridge-Building State. Not a Road and Not a Bridge, the Structure Shown at the Right Is One of North Carolina's Floating Highways, Resting Lightly Upon a Bog in Washington County. This Floating Highway Provides a Substantial Roadbed Over Swamp Muck. At the Far Right Is an Ingenious Device Used on Cape Hatteras to Defeat the Soft Sand. At Lower Right, the New 3.45-Mile Albemarle Sound Bridge Recently Completed in North Carolina. **See Page 5.**

A Century-Old Bridge, Below, Facilitates Foot Travel in the Blue Ridge Section of North Carolina. Going, Going, But Not Quite Gone Are the Old Covered Bridges Like That at the Right.

Composite-Type Bridge Built in North Carolina

Substructure of Creosoted Timber Carrying Concrete And Steel Deck Provides Economical Structure

By A. G. HAMPTON, Associate Highway Engineer, U. S. Bureau of Public Roads

✦ THE new 3½-mile bridge across Albemarle Sound in North Carolina is of interest not only because of its size and cost, but also because of unique structural details designed to permit the use of a trestle type of structure under rather severe natural conditions.

Coastwise vehicular travel in the State has been pretty much confined to narrow strips of land cut off by numerous estuaries indenting the coast, and the extensive peninsula lying between the Albemarle Sound and the Pamlico River has been especially handicapped by a lack of convenient highway connections to coastal routes. The Albemarle Sound on the north has been a natural barrier against the transportation of produce to northern markets. This Sound is 3½ to 15 miles in width and extends inland a distance of 60 miles to the mouths of the Roanoke and Chowan Rivers, each of which is now bridged by structures of major importance and magnitude. The bridging of the Albemarle Sound, long a dream of local citizens, was recently completed by the North Carolina State Highway and Public Works Commission.

Conditions at Site

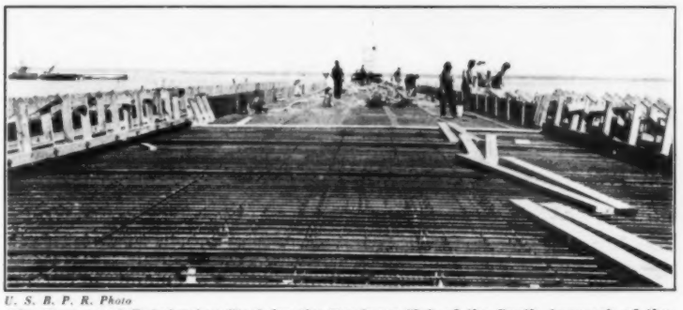
As foundation conditions appeared to be fairly uniform along the Sound, a site was selected about 5 miles east of Edenton, which is a location requiring the minimum length of structure. Soundings and test piles at this site indicated that for the central 2¼-miles there is about 20 feet of water, beneath which is a stratum of soft mud and clay that extends to an average depth of 30 feet. Below this is a firmer clay and sand stratum into which piles could be driven 20 to 35 feet before taking up. On both sides of this rather uniform middle portion, the strata step up sharply for some 20 feet, then slope gently upward to either shore.

The water is fresh and is not noticeably affected by ocean tides, but in stormy weather disturbances of considerable magnitude develop. The structure will be exposed to the full force of storm winds and to an appreciable amount of wave action. There is very little current or tidal flow, however, and only slight danger of damage from accumulated ice is anticipated.

Reasons for Design

Limited funds led to the decision to use a composite-type bridge, consisting of steel beams and concrete deck carried on a creosoted-timber substructure. Foundation data showed that 2,400 of the piles for this substructure would run 80 to 100 feet in length, while the long unsupported lengths of pile made it desirable that they be of larger diameter than called for in standard specifications. These requirements could not be met by any timber in the east, and led to the use of west coast Douglas fir. The durability of this timber in the moist warm climate of the Carolina coast was problematical and it was thought advisable to specify a preservation treatment commensurate with that given the southern yellow pine of this region.

On the advice of timber authorities the specifications were drawn up calling for full sapwood penetration, and a retention of 16 pounds per cubic foot of creosote oil applied by the full cell process. Air seasoning was specified in order to minimize checking. When treatment was started, however, it was found that while the full sapwood penetration could be obtained, the retention of 16 pounds per cubic foot was impracticable. This was due to the low sap-to-heart ratio of the piles, as well as to their unusual lengths, which allowed only one-half the normal amount of end penetration. The sap-to-heart ratio of these piles when compared with that of the average-size pile indicated that, with the same degree of sapwood treatment, a 12-pound retention in the larger pile corresponded to 16 pounds in the average. The 16-pound minimum retention called for in the specifications was accordingly reduced to 12, but full sapwood penetration was required at all times.



U. S. B. P. R. Photo

The Forms and Reinforcing Steel for the Roadway Slab of the South Approach of the Albemarle Sound Bridge. Note the Plywood Forms in the Background.

Design details were worked out to secure a maximum degree of rigidity for a trestle-type structure. A roadway grade 17 feet above water provided sufficient bent height for effective bracing and places the superstructure out of reach of ordinary storm waves. The four-pile bents were provided with a double system of sway braces which were attached

(Continued on page 24)

A New Caterpillar Diesel-Powered Lorain 40 on a Georgia Road Job

¾-Yard Excavator Powered with Diesel

The Lorain 40 ¾-yard excavator is now powered with the new Caterpillar Model D4500 4¼ x 5½ bore and stroke diesel engine, according to a recent announcement from the Thew Shovel Co., Lorain, Ohio.

The machine shown in the illustration, one of the first with this new engine, is owned by John Managhan, Inc., of Pelham, Ga., and is shown working near Alapaha, Ga., loading top soil for road construction. It is handling approximately 100 yards an hour and uses 1½ gallons of fuel oil an hour.

New Small Diesels

Announcement of the American manufacture of 15 to 20-hp Covic diesel engines was made recently by John K. Northrop, Vice President of the Northill Co., Inc., Los Angeles, Calif. These small diesels, which have been in use in Europe for some time, will be manufactured here in a complete range of models for such applications as powering compressors, pumps, concrete mixers, conveyors, small rollers, welders, trenchers, small tractors and similar equipment. The units will be available as engines, engine and clutch units and complete power units with radiators. An automotive model with four-speed transmission will also be included in the Covic line.

The engine is of the horizontal opposed-cylinder design, a four-cycle valve-in-head type of unit, with a 3 5/32-inch bore and 3 15/16-inch stroke. The crankshaft is of the built-up two-throw type, made of steel of 70 to 80 tons tensile strength, with oversized roller bearing support and a deep row ball bearing for centering. Needle-type roller bearings are carried on the crank pins, with the upper ends of the connecting rods bronze-bushed. The crankshaft is both statically and dynamically balanced.

The crankcase is of aluminum alloy or cast iron. The crankcase and cylinder blocks are one casting, with a separate casting for the sump. The sump provides a water-jacket around the lower crankcase, for cooling lubricating oil. The patented Covic pre-combustion chamber is formed by a screwed-in insert. Cylinder liners are pressed into the block and held in position by the cast iron heads. The camshaft is driven by a double chain from the crankshaft.

The patented water and lubricating pumps are mounted on the same shaft, also driven from the crankshaft. Water passes over and around the lubricating pump as a second means of removing heat from the oil. The engine is equipped with all-pressure lubrication, with the lubricating oil pump taking the oil from the sump through an edge-type filter, through passages integral with the crankcase to the main bearings, crank-pins, camshaft, then through hollow push rods over the rocker arms and valve mechanism back to the sump. The entire fuel pump assembly is above the cylinder block, enclosed with an aluminum cover plate which can be removed in a few minutes. Bosch fuel pumps and fuel injectors are used.

Literature describing completely this new line of small diesels for every type of application within their power range may be secured from the manufacturer.

New Clutch Co. Office

The Twin Disc Clutch Co., Racine, Wis., has announced the opening of a new parts and service branch at 195 Tenth Ave., New York City, to be known as Twin Disc Parts and Service, Inc. This new office and depot for the servicing of Twin Disc power transmission equipment will be under the management of W. L. Dixon, Sr., Eastern Sales and Service Engineer of Twin Disc Clutch Co., for many years.

Scrapers Mix, Carry, Place Earth for Dam

J. A. Terteling & Sons, contractor for placing the embankment material on the earth-fill Unity Dam, a U. S. Bureau of Reclamation project near Unity, Oregon, put its LeTourneau Carryall scrapers to an unusual use on this job. The borrow pit contained various strata of pervious and impervious material and the earth for the fill had to be carefully selected and mixed to meet rigid Bureau specifications.

The Carryalls loaded on a down grade in the borrow pit, passing through the various strata to pick up the proper materials, carried the material 2,500 feet from the pit to the dam site and there placed the material in the fill. Because of the length of the haul, the contractor used the scrapers in tandem. Two of the outfits consisted of one 13-yard and one 8-yard Carryall, pulled by a Caterpillar D8 tractor, and the third tandem consisted of two 12-yard scrapers pulled by a D8 tractor.

High Torque Feature Of New Electric Saw

A new model of a portable electric saw with a 2-inch cutting capacity has recently been announced by the Syntron Co., 227 Lexington Ave., Homer City, Pa. This new unit is designed for heavy-duty service and includes a number of new features, such as a tilting base for bevel cuts, an oversize excess-power universal motor, double pole, underwriters-approved trigger switch, silent worm gear drive, and an automatic telescoping safety guard. A light weight of 18 pounds and well-balanced handle position make possible one-hand use.

A 6½-inch combination rip and crosscut saw blade is supplied as standard equipment and abrasive discs for slotting brick and similar material may also be used.

Road Stabilization With Sodium Chloride

An 18-page illustrated booklet "Developments in Road Stabilization with Sodium Chloride" has recently been issued by the International Salt Co., Inc., Ithaca, N. Y. It contains the paper on that subject presented by C. D. Looker, Director of Research for the company, at the convention of the American Road Builders' Association last January, the discussion of the paper by R. M. Rowat, Commercial Research Manager, Salt Division, Canadian Industries Ltd., Montreal, and in addition a large number of photographs showing salt stabilized roads in various sections of the United States and Canada and methods and equipment used for this type of low-cost road work.

Placing Concrete Easily

Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., has just issued a new folder, Bulletin No. 321, which illustrates and describes the complete line of Rex construction equipment. Outstanding in this bulletin is the Rex 160 Pumpcrete which is offered to contractors whose jobs require the placing of less than 5,000 cubic yards of concrete.

Unusual Sea Wall Built at Tampa, Fla.

(*Continued from page 2*)

ingenuity in design and so constructed as assembled to reach from the top to the toe of the wall with forms 3, 4, 5 and 6 at the back and forms 1 and 2 on the front or face of the wall. They were constructed of heavy timber as they were intended to be used over and over and in fact were so used as much as six times before it was necessary to resheet the face. The truss members as shown in the plan were firmly wedged to the coffer sheeting, to the bearing piles and to the pile bracing. The bottom forms were made in 2-foot sections so that they could be placed easily between the bearing piles and also as this made them easier to strip.

The front forms for the lower section weighed 1,100 pounds and were handled by a small hand hoist and gantry.

The spacer blocks, an isometric drawing of which is shown, were a stroke of genius even beyond the fondest hopes of the engineer who designed them. The idea behind the spacer blocks was to furnish a truly fool-proof method of spacing the forms and at the same time supply an exact template for the placing of the reinforcing steel with the ties attached. This resulted in a block that could be produced with gang molds by the ordinary labor employed. The block was 13 inches long and cast with a ¾-inch paper tube through the center for the Universal tie rod that was used to tie the forms firmly together.

The front reinforcing steel was desired to be placed exactly 4 inches from the front of the wall for protection from sea water and the back steel just 3 inches from the back of the wall. This was accomplished by casting a ½-inch notch 3½ inches from the larger end of the spacer block, 3½ x 2¾ inches, and a step 4¾ inches from the smaller end, 3 x 2¾ inches, to receive the steel rods. To insure further the placing of the rods at these points tie wires were cast into the block at these points. A 24-inch loop of No. 16 annealed wire was used with the ends projecting 9 inches.

The blocks were placed against the back forms and perpendicular to them, thus making the blocks at 45 degrees with the horizontal. These provided excellent stepping blocks for the men placing the reinforcing steel and soon they considered the blocks as part of their aids to speedier work.

Casting Spindles for Hand Rails

Another feature of the project is the ornamental hand rail along the shore which required the precasting of some 10,000 spindles. Thirty cast iron molds were purchased for the ornamental spindles and a crew of men was trained in the proper handling of the casting. At first considerable difficulty was experienced with shrinkage cracks at re-entrant angles in the forms but this was overcome by a simple method of pouring.

The thirty forms were set up for pouring, the lower third of the forms filled and the concrete thoroughly rodded. By the time the pouring had progressed around the whole set of forms the first form poured had taken its shrinkage and the next pour was placed on top for the next third and so on for the top section, completely eliminating the shrinkage cracks without delaying the production. This work was started a full six months before the first spindles were needed and in this way the small crew was able to pour, strip and rub the spindles at a sufficient pace to care for all requirements.

Backfilling

The backfilling of the wall was handled by a diesel-powered hydraulic dredge leased by the City of Tampa and through its efforts a new area of 10 acres was created behind the first section of wall alone. The problem of backfilling was to place good clean sand against the wall, since a pocket of quicksand or muck would create a thrust and uplift that might have proved disastrous. The wall was designed to take advantage of the natural slope of good firm material behind it so the best sand was so placed and then backfilling proceeded without selection of material for the balance of the area.

Assembling Reinforcing Steel on the Concrete Spacer Blocks for the Tampa Bayshore Sea Wall

Equipment

The equipment used for this project was the most modern in type and quite in accordance with the best practice and with the character of the design.

The pile driving was handled by a floating unit carrying a 2,500-pound drop hammer for bearing piles, a McKiernan-Terry No. 7 steam hammer for the steel sheet piling and a Vulcan pile extractor for pulling the cofferdam sheeting. For unwatering the cofferdam there were four pumps: one 6-inch gasoline-driven centrifugal delivering 75,000 gallons per hour; one 4-inch centrifugal delivering 30,000 gallons per hour; and two 3-inch centrifugals of 15,000 gallons per hour capacity which assisted in unwatering and then were used to keep the water down during construction. There was one jetting pump for jetting the piling.

The concrete equipment consisted of one 3-bag CMC mixer with automatic water control which was used for the entire length of wall and one 2-bag CMC mixer used for pouring the ornamental rail and precast piling.

(*Continued on page 19*)

Keeping Rock Drills Functioning Properly

A particularly well-prepared 36-page booklet has been issued by The Texas Co., 135 East 42nd St., New York City, entitled "Rock Drills—How to Keep Them Functioning Properly." Starting with a brief history of the mechanical rock drill, the text considers the problem of the drill "doctor", telling where to look for trouble and what to do about it. Then it gives helpful hints aimed to preclude troubles with rock drills of all types.

The second half of the book is devoted entirely to the best methods of lubricating various types of drills. There is more good information packed into this book than has been released for many a day on the general subject of the care of rock drills. Copies may be secured free by writing direct to The Texas Co., and mentioning this item.

New Booklet on Road Bases

Probably the most discussed subject in highway circles during the past few years has been that of road bases, their stability and how stable bases should be designed and constructed. In a new booklet "Better Bases for Better Roads," just issued by the Solvay Sales Corp., 40 Rector St., New York City, some of the facts about road bases and the use of calcium-chloride-stabilized graded-aggregate mixtures for pavement bases are discussed.

The booklet sets forth the five requirements for a satisfactory base, density, uniformity, all-weather durability, flexibility and low cost, and then goes on to show how such bases may be prepared through the use of calcium chloride to stabilize graded aggregate.

Copies of this booklet may be secured by interested contractors and state and county highway engineers direct from the Solvay Sales Corp., by mentioning this magazine.

Buffalo Branch Manager Appointed by Gar Wood

Announcement has been made by the Hoist & Body Division of Gar Wood Industries, Inc., Detroit, Mich., of the appointment of Ralph J. Reich as Manager of the Buffalo, N. Y., Branch Office. Mr. Reich, who has been Assistant Manager in Buffalo for a number of years, will also have supervision over the Syracuse, Rochester and Buffalo territories.

WALTER

FOUR-POINT POSITIVE DRIVE

will see you through

Smashing through heavy snowdrifts, hauling twenty-five ton trailers in coal-stripping operations, carrying enormous logs over sketchy forest roads, transporting big loads of pipe across country in the oil fields—these are just a few of the hard jobs that Walter Tractor Trucks and Snow Fighters take as daily fare.

The remarkable records established by Walter Trucks in getting through—no matter what the odds against them—are chiefly due to a patented feature possessed by no other vehicles. We mean Walter Automatic Lock Differential, providing *Four-Point Positive Drive.* Many trucks have "four-wheel drive", of course. Only the Walter, however, has Four-Point Positive Drive, insuring full power on all wheels under all conditions.

If one wheel spins on a slippery surface, its mate does not lie dead, but continues to exert full pulling power. It would be necessary, therefore, to slip all four wheels to stall a Walter, instead of merely one front and one rear wheel, as in ordinary four-wheel drive.

Write today for complete information on Walter Trucks and Snow Fighters.

WALTER MOTOR TRUCK CO.

1001-19 IRVING AVE., RIDGEWOOD, QUEENS, LONG ISLAND, N. Y.

Dual-Lane Road Laid By Dual-Drum Paver

F. N. Thompson Completes New 20-Foot Pavement into Charleston, S. C., with New Paver and Two Finishers

(*Photos on page 36*)

✦ THE entrance to Charleston, S. C., from the northwest via U. S. Routes 52 and 78 has been greatly improved by duplicating the existing two-lane concrete roadway, with a wide planting strip between the two roadways. The contract for 7.544 miles of this paving was awarded to F. N. Thompson of Charlotte, N. C., who used imported cement, a dual-drum paver, and transverse and longitudinal finishers to complete the work in fast time this fall.

Unusual Cement Handling

On this job the contractor used 22,000 barrels of imported Belgian cement delivered in bags by ship to a dock 3 miles from the job. The cement was hauled on trailer trucks, 200 to 300 bags to the load, and run alongside the cement platform. From this point the cement was handled much like bulk cement. Eight men on the platform dumped the bags of cement, 6 bags per batch, into Kone Karts and rolled them to two dumping holes at the end of the platform, beneath which the batch trucks drove through in a depressed roadway. The platform was completely covered by a 60 x 90-foot tarpaulin which protected the 900 barrels of cement stored on the platform in case of delays in hauling. The heavy timber platform was supported on a cribbing of railroad ties.

While imported cement was used throughout most of the work, a short curve at the northwest end of the job was put in with domestic high-early-strength cement to permit early opening of this portion of the pavement.

Batching Plant

Only one batching plant set-up was used and this was one mile dead haul from the road and required a maximum haul of 2½ miles south and 6 miles to the north end of the job. There were two complete batching plants for sand and crushed granite. They were set up about 200 feet apart and operated as completely separate units. The first, a wooden bin with Johnson batchers, was served by a Northwest crane with a 45-foot boom and a 1-yard Owen bucket, while the second, a Heltzel steel bin with Johnson batchers, was served by a Lorain 40 crane with a 35-foot boom and a ¾-yard Blaw-Knox bucket. The batches consisted of 2,261 pounds of crushed granite and 1,135 pounds of sand for the 6-bag batch. The twenty 2-batch trucks backed under the batchers and then drove out to the road where the cement platform was located. Two men were used in the cars for cleaning up. The contractor kept 30 cars on the sidings and received excellent switching service twice a day from the Southern Railway.

Grading and Form Setting

Where the rough grade was too hard for easy manipulation, the contractor used a Ted Carr scarifier pulled by an Allis-Chalmers Model L tractor. A pair of Galion 12-foot motor patrols trimmed the grade and cut the trenches for the 9-inch Heltzel steel forms. The form trenches were trimmed by a crew of six men who were followed by two form-setters with four helpers. As soon as the forms had been set up an R-B subgrader with a ramp bridge over it was used to cut the subgrade for the 8-6-6-8-inch section concrete slab. Behind the subgrader the forms were brought to line and grade by one form liner with two helpers and a Lakewood power form tamper.

The contractor used a special crew which worked from 4 to 9 a.m., pulling forms and hauling them forward to be spotted along the shoulder for the form-setting crew. They were hauled by trucks where possible, but along swampy areas and in wet ditches a log wagon and tractor were used.

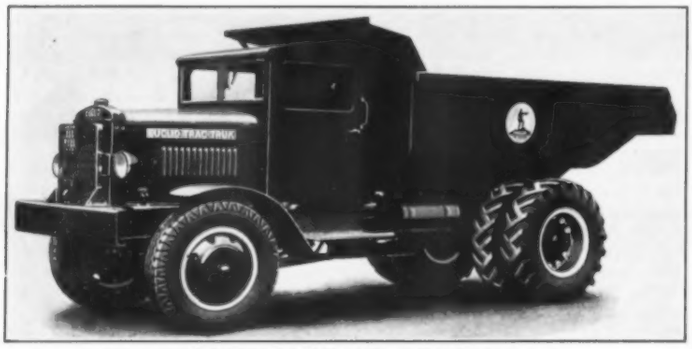
Paving and Finishing

This was a Federal-Aid Project operating with a 40-hour maximum week for unskilled labor but the regulation was waived for skilled labor which worked 60 hours per week. Working an average 10-hour day, the contractor shut the job down at noon on Saturdays and did not start up again until Monday morning.

When the batch trucks arrived on the subgrade they turned through a space left in the forms behind the subgrader and then backed to the 1938 Ransome Dual Drum paver where one man dumped the batches and insured clean dumping by hitting the floor of the truck body with a large wooden mall. The 34-E paver pulled a 3,800-pound Heltzel subgrade planer and 1,200-pound Heltzel steel subgrade checking template. The subgrade planer was equipped with a hand wheel at each end for quick adjustment. Two men shoveled out the dirt from in front of the planer as required.

The reinforcing in the concrete slab consisted of 4-foot bars across the longitudinal dummy joint and 6-inch square mesh of ¼-inch wires laid over any portions of weak subgrade. The center joint bars were ½-inch round deformed bars placed on 4-foot 10-inch centers and supported by wire chairs. Translode expansion joints were used with 1-inch joint material.

(*Continued on page 20*)



The New Euclid Rear-Dump Trac-Truk

Rear-Dump Trac-Truk For Road Building

The new rear-dump Trac-Truk, recently announced by the Euclid Road Machinery Co., Cleveland, Ohio, is designed for fast economical road building and dirt-moving jobs. The low wide body makes possible fast loading and easy and quick spotting under the shovel, while a reversing box with midship transmission provides the same fast speeds both forward and reverse.

The new Model K has a capacity of 8 yards, a loading height of 7 feet 3 inches, a dumping angle of 70 degrees, a wheelbase of 12 feet 2 inches, gasoline or diesel power, full-floating double reduction rear, integral frame and axle construction, low speed gear selectivity and full air brakes.

Literature describing this new Trac-Truk may be secured by interested contractors and engineers direct from the manufacturer by mentioning this magazine.

Winners of Welding Contest Announced

The Jury of Award of the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, after judging thousands of papers submitted in the $200,000 Award Program, has announced the winners of the 382 awards.

The Grand Award of $13,941.33 went to Mr. and Mrs. A. E. Gibson, president and stockholder of the Wellman Engineering Co., Cleveland, Ohio, for their joint paper on all the elements required to assure the business and technical success of users of welding throughout industry. An award of $11,397.06 went to Anant H. Pandya and R. J. Fowler, Engineers, Diagrid Structures, Ltd., London, England, for their paper "The All Welded Grid Applied to Plane and Spatial Structures." Robert V. Proctor, General Manager and Chief Engineer, Commercial Shearing & Stamping Co., Youngstown, Ohio, received an award of $2,747.39 for his paper on arc-welded tunnel liners, and Robert S. Treat and John F. Willis, bridge designers, Connecticut State Highway Department, Hartford, received jointly $1,526.33 for their paper on the two-span rigid frame for grade separation.

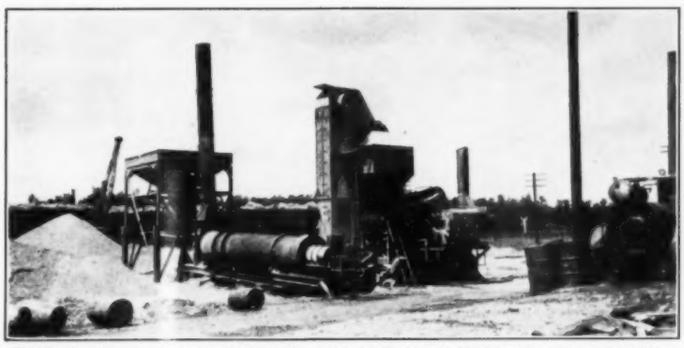
Awards in the construction machinery division went to A. G. Ruthrauff, Link-Belt Co., for a paper on an arc-welded frame for a locomotive crane; Robert G. Shoemaker, Warren Northwest, Inc., Portland, Ore., whose paper was "The Design of an Asphalt Paving Plant"; R. H. Zeilman, Thew Shovel Co., for "Arc Welded Design of Rear Turntable Bed for Power Shovels"; Reinhard H. Bergmann, Harnischfeger Corp., for his paper on arc-welded convertible excavators; Joseph Kuchar, Athey Truss Wheel Co., whose paper was entitled "Arc Welded Design in Manufacture of Heavy-Duty Tractor Wagons and Trailers"; and H. L. and F. Mitchell, of Milwaukee, for their joint paper "All-Welded Boom for Crane, Clamshell or Dragline."

The Foundation's Award Program, which began eighteen months ago, was judged by thirty-one engineering authorities from leading universities and colleges throughout the country. In making the announcement, the Jury said "The Central Committee of the Jury of Award of the James F. Lincoln Arc Welding Foundation finds that the savings to industry by arc welding claimed by authors of papers aggregates $1,600,000,000. This figure is arrived at after discounting some very enthusiastic claims. It is an amazing figure and undoubtedly would have been much greater had all of the authors estimated gross savings from the application of arc welding to their products."

Industrial Power Units Described in New Booklet

KRW industrial power units, built around Ford V-8 85 engines, in open and enclosed models, with or without clutch for direct drive, and with extended base for special mounting, are described in a folder issued recently by K. R. Wilson, 10 Lock St., Buffalo, N. Y.

Copies of this folder which contains complete specifications on these units as well as illustrations of the various models may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.



The Barber-Greene Portable Mixing Plant for the Raceland-Midway, La., Retread Paving Project, Showing the Drier and Mixer in the Center and the Steam Boiler for Heating the Asphalt at the Right

Retread Paving Method For Louisiana Roads

(Continued from page 1)

heated as described above and the materials from the drier were combined, the resulting mix was delivered to the trucks at about 150 degrees. It lost scarcely any heat during the short haul to the road for final spreading.

This plant had an average output under the set-up at Raceland of 300 tons of mix in 10 hours. The best day was 510 tons, operating under these conditions.

The Mixes

Before the Barber-Greene mixing machine was installed, considerable experimental work was done at the Raceland site, using a 10-S Jaeger trailer mixer to determine the proper mix for the type of work to be undertaken and to settle on the proper amount of asphalt to be used. The final mixes that have proved their value through ease of handling, resultant stability on the road and economy of asphalt were as follows:

Aggregate for Base or Leveling Course	
Passing a 2-inch screen	100 per cent
Retained on a 1-inch screen	15 to 50 per cent
Retained on a ⅝-inch screen	25 to 45 per cent
Retained on a ¼-inch screen	20 to 40 per cent
Retained on a 4-mesh screen	5 to 15 per cent
Passing a 10-mesh screen	10 per cent

Surface Course Aggregate	
Passing ⅝-inch screen	100 per cent
Retained on a ¼-inch screen	60 to 80 per cent
Retained on a 10-mesh screen	15 to 30 per cent
Passing a 10-mesh screen	5 to 20 per cent

Considerable experimenting showed that the ideal aggregate for the leveling course was 5 parts of the base course aggregate as shown by the table above and 2 parts of the surface course aggregate.

The experimental mixing showed that the 5 per cent of asphalt which was considered the best for the mix could be cut to 3 per cent for the base course and 3½ to 4 per cent for the surface course, resulting in some saving in this material.

Spreading the Mix

The spreading machine is the new Barber-Greene Tamping-Leveling-Finisher which proved its value as a finisher on this job as evidenced by the smooth-riding qualities of the base course even before the surface was placed. The old surface had many irregularities which were leveled off by the finishing machine.

The mix was hauled out to the finishing machine by a fleet of six trucks which raised the bodies with a hydraulic hoist, threw the gears into neutral and the truck was pushed by the self-powered finishing machine while the mix slid out as required into the receiving hopper of the finisher. The base course was laid with a 3-inch crown and the surface course uniform on it. The base was spread 2½ inches by machine for a 2-inch compacted course although it was actually spread thicker in many places to make up for irregularities in the pavement being resurfaced. The surface course was spread 1¼ inches by machine for a 1-inch compacted wearing surface. Both the leveling and the surface courses were spread in 10-foot strips.

One man went ahead of the finisher and set a line down the center of the

(Continued on page 29)

Product Prevents Weld Spatter from Adhering

A new material known as Glyptal No. 1294 has been announced by the General Electric Co., Schenectary, N. Y., for preventing the adhesion of weld spatter to metals which are to be welded. This material, which can be used without harm on any metal surface, will not produce carbon to make the weld hard or brittle nor will it reduce ductility.

For applying the new Glyptal preparation, spraying is recommended in preference to painting because it assures a thinner coat which is just as effective and more economical.

Three Types of Earth Drills

The three types of Buda-Hubron earth drills for truck, tractor or trailer mounting, which will dig holes 24 inches in diameter 6 feet deep in three minutes, are described and illustrated in Bulletin No. 868 of the Buda Co., Harvey, Ill. These drills, powered by an air-cooled engine built for heavy duty, have all parts of the drill head assembled in one unit, to insure alignment. The lifting mechanism is strong, two roller chains being used to lift the dirt from the hole.

Copies of this bulletin, describing in detail the feature of these drills, which have been used in forty-one of the forty-eight states and in many foreign countries in a variety of soil conditions, may be secured from the manufacturer.

A V-Plow and Wing on an FWD Truck, Rolling Snow from the Shoulder to Widen a Road in Shawano County, Wis., Last January at 20 Degrees Below Zero

Improved FWD Trucks For Snow Removal Work

With the recent announcement of several new models and mechanical improvements and new styling throughout the entire line, FWD four-wheel-drive trucks, made by the Four Wheel Drive Auto Co., Clintonville, Wis., are available in sizes ranging from 13,000 pounds gross to 15 tons capacity, for all types of snow removal and year-round highway maintenance. Each unit is designed to handle an appropriate-sized snow plow, underbody scraper blade, dump body and other auxiliary equipment necessary to maintain roads during every season of the year.

The Models CU, CUA, SU, SUA, YU, and M series are particularly adapted to the more punishing snow removal work, where the larger V, rotary or one-way plow is used and terrific buffeting must be sustained both on the front end and sideward.

The frame width has been changed to 34 from 36 inches, permitting more tire clearance where duals are used on the rear, and the cab width has been increased from 60 to 70 inches at the rear. To permit ready installation of various control valves for the operation of plows, underbody scrapers and similar equipment, the instrument panel has been offset to the left of the cab, and is readily visible to the operator through the large steering wheel. By this installation, the control valves may be mounted on the dash, under the cowl, with only the control handles protruding into the cab, and providing a clear space for the knees and feet of the operator.

New Bulletin on Wellpoints

The features of Griffin wellpoint systems for drying up wet jobs are described in an interesting new bulletin recently issued by the Griffin Wellpoint Corp., 725 East 140th St., New York City. Illustrations showing a number of types of jobs which were unwatered by Griffin Jet 'N Drive wellpoint systems are included.

Copies of this new bulletin may be secured by interested contractors and engineers direct from the Griffin Wellpoint Corp., by mentioning this magazine.

Maintenance Tool For Contractors

Repairs of broken parts of construction equipment in the field frequently require the removal of gears and wheels from shafts. Edelblute Mfg. Co., Reynoldsville, Pa., has developed a handy tool for this work which also has many other applications. This Anchor gear and wheel puller is really a whole outfit of pullers designed into one compact tool.

It consists of three double-end chains with grab hooks on one end for spoked wheels and special close-grip hooks on the other end for use on solid wheels. The remaining part of the puller is a yoke through which runs a puller screw. When using this puller on spoked wheels the three chains, equally spaced, are hooked around the spokes and set close to the hub. Then the point of the puller screw is placed against the end of the shaft and each chain is drawn tight and slipped into a forked socket on the three-armed yoke. Then the

The Anchor Gear and Wheel Puller

screw bar is tightened with a wrench, making certain that all three chains are pulling equally, and that the chain is not twisted. On solid gears and wheels the close-grip hooks are placed over the rim of the wheel and the procedure is the same as above. A binder rope is also included in the outfit, which is placed in a groove on the close-grip hooks to hold them snug to solid gears and wheels.

Complete information regarding the Anchor gear and wheel puller may be secured by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Asphaltic Products As Used for Highways

"Trends in Use of Asphaltic Products for Highways" is the title of Bulletin No. 31 in the Information Series issued by The Asphalt Institute. This paper, prepared by Bernard E. Gray, Chief Engineer of the Institute, and presented before the Association of Highway Officials of the North Atlantic States last February, discusses some of the more important aspects in the present employment of asphaltic materials, not only in relation to their use in any particular type of surfacing, but also with regard to the design of the highway system as a whole. Some of the subjects covered are stabilization, surfacing, measure of adhesion and the selection of asphaltic material.

Copies of this Bulletin Number 31 may be secured without charge by writing direct to The Asphalt Institute, 801 Second Ave., New York City, and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

The New Firestone Tire Built for a New LeTourneau Earth-Moving Unit

New Giant Tire Built For Earth-Moving Unit

The latest giant of the tire industry was recently completed by the Firestone Tire & Rubber Co., Akron, Ohio, for use on a new LeTourneau mammoth earth-moving unit. This tire is 79 inches high, weighs 1,304 pounds and is built to carry a load of 25,000 pounds.

The diameter of the rim on which the tire is mounted is 32 inches, the rim width 17 inches, and the tread width, 20 inches. The tube alone weighs 102 pounds and the protective flap, 36 pounds. It has a volume of 62,500 cubic inches when inflated to its regular operating air pressure of 45 pounds. One hundred miles of Firestone patented Gum-Dipped cord was used in building this tire.

New Special Welder

The new P & H-Hansen 200-ampere Special welder, recently announced by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., is designed to provide a somewhat wider operating range than the 150-ampere units and yet is lower in price.

Consisting of a 200-ampere commercial rated 30-volt 6-kw generator with an intermittent welding range of 35 amperes to a maximum of 225 amperes, the Special's generator is connected by a flexible coupling to a 24-hp 4-cylinder water-cooled Continental gasoline engine equipped for hand starting and with a magneto ignition system. The entire unit is mounted on a formed steel base and is equipped with a fully enclosed sheet metal canopy with removable sides for easy access to all parts. Although in its standard form the Special is a stationary type machine, it can be equipped with P & H two-wheel pneumatic running gear.

The Special is built to handle electrodes up to 7/32 inch in diameter under continuous manual operation.

New Diesel Tractor Booklet

The capacities, specifications and mechanical features of the largest Caterpillar diesel tractor are included in a new 32-page illustrated booklet recently issued by the Caterpillar Tractor Co., Peoria, Ill. The pictures show many action views of the D8 on the job, as well as cutaway views of the engine, fuel system, transmission, etc.

Copies of the booklet, Form 4876, may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

Meriam of Lincoln Retires

Announcement has been made by the Lincoln Electric Co., Cleveland, Ohio, of the retirement of J. W. Meriam who for the past 24 years has been Vice President and Secretary of the company.

Mr. Meriam's retirement, at the age of sixty, closes a business career which spans the development of arc welding.

Although retiring from active service, Mr. Meriam will remain a director of the company. A. F. Davis, Vice President, has been made secretary also.

Highway Tax Costs

A study of the cost of our highways, the means of financing them through special taxes paid by highway users and how that money is spent has been made by John E. Walker, former Special Assistant on Taxation to the Secretary of the Treasury, for the National Highway Users Conference in order to bring to light pertinent facts about expenditures for highway purposes and special taxes paid by highway users.

According to this study, the total amount collected from highway users in special taxes during 1936 was $1,377,148,000. Of this sum, $1,066,340,000 was paid to the states in registration fees, gasoline taxes and motor carrier taxes; $18,400,000 to counties and municipalities in fees and taxes; and $292,408,000 to the Federal Government in excise taxes, which included the one-cent tax on gasoline. In addition, motor vehicle owners paid general taxes including $41,435,000 in personal property taxes on their vehicles.

It seems wise to emphasize these facts, for only the people who pay these taxes for the express and stated purpose of financing our highways can prevent the use of these funds for other than highway purposes. The more the general public can be acquainted with the facts and be made to realize how the politicians are practically stealing their money for vote-getting hand-outs, the sooner this gas-tax diversion will be stopped and the money collected from highway users will be spent where it should be spent, on the construction and maintenance of our highways.

Copies of this study "Highway Tax Costs" may be secured by interested readers of CONTRACTORS and ENGINEERS MONTHLY direct from the National Highway Users Conference, National Press Bldg., Washington, D. C.

Ready for Snow Removal?

The use of Marmon-Herrington all-wheel-drive trucks for use in snow plowing this winter as well as for general road-building and maintenance service the year round is discussed in a new folder describing the features of these trucks and their adaptability for heavy-duty service.

Copies may be secured by interested state and county highway engineers and contractors direct from the Marmon-Herrington Co., Inc., Indianapolis, Ind., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

More for Less $$ On County Roads

Sound Business Principles Should Be Applied to Plans For County Road System to Get Most for Money Spent

By S. E. FITCH, Superintendent of Highways, Chautauqua County, N. Y.

✦ INASMUCH as highway transportation is a big business, it should be founded on economically sound business principles. In building a road system, it is very important to select the proper types of pavement to be used on the different classes of roads. We should not let ourselves be carried away by popular clamor for uneconomical luxurious roads until such time as the farmers are out of the mud and we can afford the luxury of roads that are better than strict economy warrants.

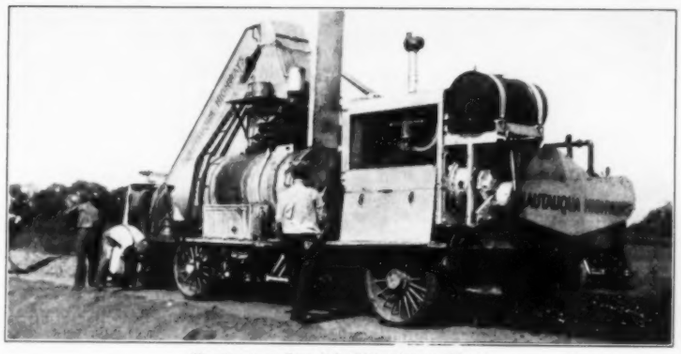
Selecting the Pavement

The proper type of road for any locality, from a business standpoint, is the one that will satisfactorily carry the traffic it will have when completed and at the least total cost which, of course, includes vehicle operating costs as well as pavement maintenance costs.

The annual pavement cost consists of the interest on cost of construction; ordinary annual maintenance costs; and what might be called a depreciation cost which would be an annual sum which if set aside each year would be sufficient to replace such parts of the road as are worn out. Vehicle costs consist of interest on the cost of the vehicle; repairs; depreciation; and operating expenses such as supplies, drivers' wages, insurance, etc.

Some of these items vary with the mileage the vehicle travels and some do not. The cost of vehicle operation also varies with the type of road but from experiments by the Iowa State College and others, we know the approximate relation of these costs for various kinds of roads. So, too, pavement costs vary with the amount and character of traffic. With so many variables, the problem becomes complicated. Nevertheless if we know the cost of constructing and maintaining our different kinds of pavements and their approximate life, or can make reasonable estimates of these factors, we can, for any given location and for any given amount of traffic and with the proportion of truck traffic known, compute the annual cost of conducting that traffic over any type of road for that locality. Then, having the assumed amount of traffic, it can be reduced to costs per average vehicle-mile for purposes of comparison.

In my study of the types of pavements suitable for the roads of Chautauqua County, I estimated such transportation costs for each of eight different types of road which available materials seemed to make feasible in this county. The types ranged from a plain dirt road to first class concrete. These costs were estimated on each type of road for many assumed amounts of traffic, 25, 50, 100, 150, 200, 300, 400, 500, 750, 1,500 and 2,000 vehicles a day. These were reduced to costs per average vehicle-mile of transportation and a curve for each type of road was plotted, using costs per vehicle-mile of transportation for abscissas and vehicles per day for ordinates. The curve which reached the lowest point on the diagram directly above the vehicles per day in question was the most economical type for that amount of traffic in that locality.



Chautauqua County's Bituminous Mixer

Don't Build Beyond Traffic

Such a diagram is suitable for use only under the average conditions encountered in the locality from which the assumed conditions obtain. Each county engineer must make up his own diagram

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Roadmaster George W. Buck in His Office in the Multnomah County Court House in Portland, Ore.

Snow Removal Problem In Multnomah County

(*Continued from page 1*)

very heavy snowfalls can take place, often with drifting conditions.

Road Mileage

Multnomah County maintains approximately 520 miles of roads. It is a long, narrow county, about 64 miles east and west and averaging about 10 miles wide. Portland is situated near the middle, representing approximately 15 per cent of the area and cutting the county square in two. The county roads to be maintained consist of:

Unimproved earth	83.55 miles
Improved earth	14.62 miles
Gravel	211.42 miles
Macadam	109.32 miles
Tar macadam	78.99 miles
Penolithic	2.03 miles
Concrete	16.87 miles
Combination	4.75 miles
Total	521.55 miles

In addition, the county clears the snow from half a dozen bridges across the Willamette River in Portland.

Equipment

The primary function of all equipment in the Roadmaster's department is to build and maintain roads. When snow comes, this equipment is adapted to snow removal. Any and all equipment must then turn to and help clear the roads, each piece being fitted with some type of snow removal unit. About the only things they don't hitch blades or plows to are the tar kettles.

Practically all the equipment is located and maintained at the Kelly Butte shops on the outskirts of Portland. Nothing more than shed garages are maintained at the District Headquarters, without repair or maintenance facilities.

The equipment for snow removal is as follows: one two-auger Snogo, mounted on an FWD truck, which latter is used for other purposes; one Rotoblade, mounted on an FWD tank truck; twelve motor trucks, all used to operate blades; two No. 1 Caterpillar diesel graders, equipped with V plows; and one Caterpillar Sixty with V plow.

Preparations

Preparations for possible snowfall are made early in November in order to have everything in shape. A-frames are put on all trucks at that time, so that the blades may be attached on short notice. A plow is also mounted on the Caterpillar Sixty and the Rotoblade attached to the 1,700-gallon tank truck. About a thousand gallons of crude oil is pumped into the tank for ballast, oil being used because it will not freeze in winter. This tanker, with its four-wheel drive and its thousand-gallon load, makes a heavy piece of equipment with plenty of power for the operation of the Rotoblade.

The diesel-powered graders for operating the V plows do not require any preparation. It takes only about an hour to attach the plow so it is not necessary to do so until a major storm comes.

New Equipment

The Rotoblade is a comparatively new type of equipment for snow removal work. It is a combination of a blade plow and a rotary and has the ability to accumulate and eliminate snow in one operation. The idea was developed in the deep-snow region of Ranier National Park. Walter Hewitt, Chief Mechanic, observed that in moving heavy snow with a blade plow, the job was only partially done. It then took more time and cost more money to widen the shoulder than it did to push the snow over to the side. Everyone knows this, but Mr. Hewitt did something about it. Starting with a blade plow, it was a comparatively simple matter to add a rotor.

Multnomah County uses its Rotoblade as a speed patrol unit during a storm. It has been found that it will operate from 1 to 35 miles an hour. When there is more snow than the rotor will expel at a high road speed of 10 to 20 miles an hour, the surplus snow flows past the rotor and is piled along the side of the road. This method is used only where speed is required in keeping the roads open. As can be seen in the illustration, the unit throws plenty of snow and well over to the side, but not so far and so forcibly as to cause damage to neighboring property. Therefore it can be operated on roads along which there are many houses.

Organization

George W. Buck is Roadmaster and County Engineer of Multnomah County, with P. C. Northrop, Assistant Roadmaster. The county is divided into six districts, each with a supervisor-foreman. Their normal crews consist of eight to ten men each, augmented as necessary in time of snow removal.

"Under conditions such as ours," said Mr. Buck, "it is not practical to have thousands of dollars tied up in special snow-removal equipment when it might stand virtually idle for two or three years. We have to rig up our regular equipment the best we can to do this work, and then get it tuned up for the job well in advance each year so as to be ready to hop in if, as and when snow flies, and it can fly here the same as in any other part of the country, on occasions."

High-Low Oil Burner For Asphalt Kettles

The Hauck High-Low regulatable burner, made by the Hauck Mfg. Co., 126-134 Tenth St., Brooklyn, N. Y., provides positive flame control on any make of tar and asphalt kettle, lead melting furnace, tool heater. bituminous d stributor or similar units. This control is obtained because of the patented construction which causes a unique change inside the combustion chamber or burner shell which, by moving the lever, changes the size of the flame and quantity of the heat. It keeps the fuel vaporized so that the burner can not form carbon or burn with a yellowish flame. Instead of the operator's adjusting the needle valve to regulate the flame, on the new Hauck burner the needle valve is used only when starting. The flame is regulated with the control lever, forward for a high flame and backward for a low flame.

This unit, which burns kerosene, coal oil, range oil or furnace oil, is described and illustrated in Bulletin No. 1031 which may be secured by contractors and state and county highway engineers direct from the manufacturer.

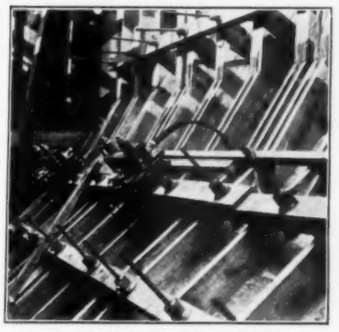
Fitting Goggles to Workers

"How to Fit Eye-Protection Goggles to Workers for Greatest Comfort and Safety" is the self-explanatory title of a new pamphlet just issued by the American Optical Co., Southbridge, Mass. The pamphlet is divided into two parts: one section is devoted to instruction on the fitting of eye-cup goggles and the other to the spectacle type of goggles.

Copies of these instructions, which are simple and can be posted on the safety bulletin board for ready reference, may be secured by interested contractors and engineers direct from the American Optical Co. by mentioning this magazine.

New Ransome Dealer in Calif.

The Spears-Wells Machinery Co., 1932 W. Ninth St., Oakland, Calif., has recently been appointed distributor for the Ransome Concrete Machinery Co., Dunellen, N. J., and will handle the complete Ransome line of concrete machinery in the San Francisco territory.



Front Forms in Place, Showing a Pair of Electric Vibrators Attached to a Wall

Florida Project Has Many Unusual Features

(*Continued from page 8*)

Other miscellaneous equipment included one 10-inch and one 12-inch dredge for backfill, one dragline for special excavation, one hand-operated gantry for handling the forms, three barges and small boats, one electric saw for form work, two Syntron electric form vibrators used on the outside of the forms to insure dense placed concrete, and electric drills and small tools.

Costs

Some idea of the efficiency developed on this WPA project may be seen from the following figures on the cost of excavation of the muck at the walls in the various cofferdams. The mucking cost for hand work in the first cofferdam was $2.50 per cubic yard, but this was cut to 60 cents per cubic yard under quite similar conditions in the last cofferdam.

This is also reflected in the cost per foot of wall including all operations. For the original 5,000 feet of the project the cost was $78.00 per foot of wall while over the entire project, 8,800 feet, the cost was reduced to $69.00.

Personnel

This WPA sea wall project was initiated for the City of Tampa, Fla., by R. H. Cason, City Engineer. Freeman H. Horton was Designing and Supervising Engineer and later became Consulting Engineer to the City of Tampa. Colonel G. A. Youngberg of Jacksonville, Fla., served the City as Consulting Engineer to review the designs and construction plans. W. E. Robinson, Chief Engineer for WPA, Tampa District, was responsible for the project from the time of its approval to its completion. G. B. Philpott was Project Supervisor.

We are indebted to Freeman H. Horton for the use of hitherto unpublished material and original plans, and to W. E. Robinson for the use of material upon which he based a paper for presentation before the Florida Engineering Society but which was not read nor had subsequent publication.

Earth-Boring Machine

The Model HC heavy-duty earth-boring machine, made by the Highway Trailer Co., Edgerton, Wis., has a number of new features, including a power leveling device, a direct boring machine drive, dual boring control and full reclining auger rack bar. The unit has sufficient power and strength to operate with the largest truck and tractor motors and in difficult soil conditions and yet is sufficiently light in weight and compact in construction to be used on 2½ or 3-ton trucks. It will dig holes small enough for the lightest pole and up to 48 inches in diameter.

Literature describing this Model HC earth-boring unit may be secured direct from the manufacturer.

C. & E. M. Photo
Spotting a Batch of Concrete at an Expansion Joint

Dual-Drum Paver Lays South Carolina Road

(*Continued from page* 11)

The transverse dummy joint, or contraction joint, was made up of ¾-inch round dowel bars 2 feet long spaced 12 inches on centers, starting 6 inches from the forms. They were placed midway in the slab so that the center of the dowel would be 3 inches from the grade line or from the top of the pavement. Instead of using chairs or wire frames to support these dowels, the contractor used a special dowel holder or spotter, made in such a way that the finishing machine could go over the joint without interference. After the finishing was completed, the spotter was removed without unduly disturbing the slab. The spotter had vertical arms with catches to hold the dowels in place until the key was released, at which time the vertical pieces swung free from the dowel and were easily removed from the concrete. Two spotters were used for a 20-foot-wide section of pavement. After the dowels were in place and the spotter removed a ⅛ x 2-inch x 9-foot 11-inch premoulded Flexplane dummy joint was inserted with a specially formed sheet metal cap which was removed after the dummy joint was in place. Then the joint was sealed and floated by hand to give a smooth pavement. The dummy joints were not edged. Two men handled all the steel, including the expansion and dummy joints.

The specified mixing time in the 34-E paver was 1¼ minutes for the two drums. This permitted delivering a batch to the road every 45 seconds. There were three puddlers with rubber boots in the concrete, two men outside and one man with a Vibrospade which was used on both sides of all joints and along the edges to prevent honeycomb.

A Jaeger-Lakewood two-screed finisher worked immediately behind the puddlers and pulled the cutter for the Heltzel Cleft Plane as well as the bridge from which one man set the ribbon forming the longitudinal dummy joints. This bridge also carried the hand-operated cutter for the dummy joint. After cutting the slot, the operator set the premoulded strip with a cap.

Behind the finishing machine came the Koehring longitudinal finisher operated by one man. The next finishing operation was handled by two hand-finishers with 10-foot Heltzel steel straight-edges, using them for both dragging and checking. Behind them came two men using a heavy 12-inch bow belt made up with a pipe frame. These men did the edging and pulled a burlap drag over the surface. The finishing was completed by two joint finishers, one working on the expansion joints which were spaced 90 feet apart and the other on the intermediate contraction joints spaced 30 feet apart. Both men used 3-foot sections of Heltzel steel straight-edges, equipped with a handle on top, for checking the pavement elevation on both sides of the joints all the way across the slab.

The average run of the paver was 500 batches in 10 hours, with the biggest day's run being 663 batches. The average slab laid on this job was 1,300 feet per 10-hour day, and the largest 1,650 feet.

Curing and Water Supply

Two men with a rolling bridge spread wet burlap on the concrete immediately behind the joint finisher. The burlap was left on and wet overnight and then removed early the next morning, the slab checked by the inspector, and then 2 inches of dirt spread for curing. Believing that the morning after pouring is still within the critical period of curing, the contractor kept the pavement wet during the straight-edge checking by the inspector and then spread one inch of dirt, sprinkled this, and spread the second inch of dirt and sprinkled the whole. One man was kept busy with a sprinkler hose for every thousand feet of pavement or on even a shorter distance in hot weather when the earth dried out more rapidly.

Water for the job was supplied by two triplex pumps, a C. H. & E. at one end and a Jaeger at the other. These delivered water into a 2½-inch line. The contractor used as much as 6 miles of pipeline during part of the paving. The valves were placed in the line at 250-foot intervals and the paver carried 150 feet of hose. When this job started, the contractor used a 300-foot hose equipped with air-hose connections at the pipeline end, but found that the 150-foot hose could be moved by fewer men and in much quicker time than the longer hose. In spite of more frequent shiftings of the connections, time was saved with the shorter hose. Thompson uses bronze gate valves throughout on the pipeline and no cast iron bodies, as experience has proved to him that the better gate valve is good insurance.

Major Quantities

The major quantities on this contract were as follows:

Item	*Quantity*	*Unit Price*
Common excavation	164,511 cu. yds.	0.26
Overhaul	14,247 cu. yd.-station	0.015
Overhaul	162,500 cu. yd.-half-mast.	0.07
Selected porous material for shoulders	36,093 cu. yds.	0.25
Plain portland-cement concrete pavement 4" uniform	4,139 sq. yds.	1.84
Plain portland-cement concrete pavement 8-6-6-8-inches, 20' wide	90,243 sq. yds.	1.67
Bituminous premoulded longitudinal joint	42,022 ft.	0.03
Drop inlets (24 x 24 inches)	15 each	40.00
Structure excavation	1,125 cu. yds.	1.00
Class "A" concrete	661 cu. yds.	25.00
Class "B" concrete	4 cu. yds.	25.00
Reinforcing steel for structures	61,184 lbs.	0.05
Reinforcement for pavement, wire mesh	1,013 sq. yds.	0.26
15-inch R. C. pipe	1,491 ft.	1.50
18-inch R. C. pipe	2,796 ft.	1.65
24-inch R. C. pipe	732 ft.	2.35
30-inch R. C. pipe	72 ft.	3.50
36-inch R. C. pipe	88 ft.	7.00
24-inch relaid pipe	90 ft.	1.50
4-inch tile underdrain	5,000 ft.	0.60
Additional cost high-early-strength cement	3,600 bbls.	0.50

Personnel

Federal Aid Project 22 Reopened, 153 Reopened, and 116 Reopened, 7.544 miles long on U. S. Routes 52 and 78 northwest of Charleston, S. C., was awarded to F. N. Thompson, Charlotte, N. C., on his low bid of $270,596.67. Paul W. Wright was Superintendent for the contractor and D. M. Crockett was Resident Engineer for the South Carolina State Highway Department.

New P & H Coast Manager

The Harnischfeger Corp., of Milwaukee, Wis., has announced the appointment of L. T. McGuire as its Pacific Coast Manager with headquarters in San Francisco.

See the descriptions of new equipment in this issue and write to the manufacturer or to us for further details.

Experimental Seal On Airport Runways

Treatments to Determine Satisfactory Seal for Tar Mixed-in-Place Runways on Glynn County, Ga., Airport

✦ MALCOLM McKINNON Field, the 357-acre airport of Glynn County just northeast of Brunswick, Ga., is nearing completion but its 103,000 square yards of sand-tar mixed-in-place runways dried out under the hot sun so that all ductility has disappeared in the surface and the material is quite friable. The tar was applied at 2 to 3 gallons per square yard for a 6-inch mix.

Experimental rectangular areas 18 feet wide and of different lengths were laid out on the south edge of Runway No. 1 east of the hangar and experimental seals applied, using 150 and 200-penetration asphalt and varying quantities of different sands as blotters. The local sand is extremely fine with 80 per cent passing an 80-mesh sieve and 2 per cent passing a 200-mesh sieve, while two coarser sands were imported from the Altamaha and Satilla Rivers.

The Experimental Seals

As stated above, the rectangular areas are uniformly 18 feet wide and of varying lengths as shown in the paragraphs below:

No. 1 is 38 feet long, giving 76 square yards treated with 0.38 gallon of 150-penetration asphalt and 5.3 pounds of Altamaha River sand per square yard.

No. 2 is 12 feet long, giving 24 square yards treated with 0.50 gallon of 150-penetration asphalt and 5 pounds of local sand per square yard.

No. 3 is 25 feet long, giving 50 square yards treated with 0.42 gallon of 150-penetration asphalt and 4.5 pounds of local sand per square yard.

No. 4 is 11 feet long, giving 22 square yards treated with 0.41 gallon of 200-penetration asphalt and 9 pounds of Altamaha River sand per square yard.

No. 5 is 14 feet long, giving 28 square yards treated with 0.32 gallon of 200-penetration asphalt and 4 pounds of local sand per square yard.

No. 6 is 14 feet long, giving 28 square yards treated with 0.30 gallon of 200-penetration asphalt and 6 pounds of Satilla River sand per square yard.

No. 7 is 36 feet long, giving 72 square yards treated with 0.43 gallon of 200-penetration asphalt and 6 pounds of Satilla River sand per square yard.

No. 8 is 16 feet long, giving 36 square yards treated with 0.42 gallon of 150-penetration asphalt and 5.5 pounds of Altamaha River sand per square yard.

Experimental seals Nos. 2 and 3 give the richest tops, excellent for runways which do not have the traffic of highways. These would shove badly under heavy traffic but under the traffic and sun conditions of an airport runway will give a seal that will not have to be done over again for three or more years. The local sand has given good results as a blotter so that there will be a saving of nearly $1,000 in the blotter alone through the use of this sand from a knob within the airport boundaries instead of paying for imported sand from commercial producers.

The Airport

The Glynn County airport has been built largely with WPA labor and replaces an earlier and much smaller airport located about ¼ mile away on the same island, St. Simons. The three runways in the directions of the three prevailing winds, according to the wind rose, average 3,000 feet in length and are each 100 feet wide. The runways and the field are protected with range and boundary lights and obstruction lights. An electric transmission line along one side of the field is being removed and placed underground to prevent any possible accident through a low take-off. The area beyond the runways has been cleared for a distance of 600 to 1,100 feet and to a width of 500

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Tractor Official Dies

C. Parker Holt, Vice-President and Director of Caterpillar Tractor Co., Peoria, Ill., and for nearly 40 years affiliated with it and one of its predecessors, the Holt Mfg. Co., died on August 24 at his home in Piedmont, California. Mr. Holt was born in San Francisco on April 5, 1880, and was the son of Charles H. Holt, who had shortly before come from New England to San Francisco to found there the hardwood lumber business from which the Holt tractor and harvester manufacturing activities were the outgrowth, and from which after the company had moved to Stockton, California, and Charles' brother, Benjamin Holt, had joined the organization, was developed the Caterpillar track-type tractor.

Concrete Reinforcing

A condensed catalog of Steelcrete products for reinforcing concrete has recently been issued by the Consolidated Expanded Metal Cos., Wheeling, W. Va. These products include reinforcing mesh, road mesh, welded wire reinforcing fabric, metal lath, Safe-T-Mesh and accessories. All of these are produced by the Steelcrete process, the cold drawing part of which is claimed to increase greatly the elastic limit of the steel.

Copies of this catalog "Steelcrete Time Tested Products" may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item and magazine.

Steel Plate Tunnel Linings

An attractive 16-page bulletin on Armco structural steel plate linings for tunnels, shafts, caissons and conduits has recently been issued by the Ingot Iron Railway Products Co., Middletown, Ohio. The booklet illustrates the uses of Armco plate linings and presents helpful design information. In addition there are a number of field photographs showing these linings in use in railroad tunnels, air lock tunnels, sewer tunnels and similar service.

Copies of this booklet may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.

The New Hy-Way Spreader for Sand, Stone and Calcium Chloride

New Shuttle Type Of Highway Spreader

The new Hy-Way Spreader, made by Hy-Way Spreaders, Inc., 399 Albany St., Springfield, Mass., is a one-man-operated, self-contained unit adaptable to any dump-truck body and is easily and quickly attached or detached. Spreading is accomplished by a shuttle principle, operation being independent of the truck at all times as the spreader is motivated by a self-contained gasoline motor through two V-belts and a clutch for disengaging the motor. Sealed and self-aligning ball bearings are used throughout.

The spreader has a structural steel and steel plate frame, electric welded throughout. The Briggs & Stratton 4-hp air-cooled gasoline motor, with self-contained ignition controlled by a hand throttle, is mounted on a steel plate, easily removed as one unit for adjustment or repair. The shuttle is of aluminum alloy to prevent corrosion. This spreader, which is designed for use with sand, cinders, top stone, calcium chloride and salt, in road construction and ice control, replaces the original tail-gate on any standard truck from 6 to 7 feet in width. One man operates the spreader and has full control of the thickness and width of the spread, regardless of the truck speed, by opening or closing the tail-gate. When used for aggregates in road construction, the unit is equipped with a telescopic spreader board to regulate the width of the spread which is adjustable from 7 to 14 feet. The spreader board is removed when the unit is used for ice control. The manufacturer states that the Hy-Way Spreader will spread the various materials used in ice treatment up to 25 feet in width and at any speed up to 25 miles an hour.

Literature describing the features of this new Hy-Way Spreader for use in road construction and in ice control may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

Snow-Plow Handbook

Copies of the Sargent 1938 Handbook on the various types of snow plows manufactured by Maine Steel, Inc., South Portland, Maine, are now available. This 86-page book contains a complete description and specifications of Sargent V-plows, V's with one or two wings, rigid one-way plows, trip one-way plows and reversible blades, with three types of hook-ups, three types of wing mounts and three types of controls.

Interested state and county highway engineers may secure copies of this Handbook by writing direct to the manufacturer and mentioning this item.

Electric Power Plants

Nelson ac and dc electric power plants, consisting of engine, generator, meter box, ammeter, voltmeter, fuse block, fuses, mounting base and flexible coupling, made by the Nelson Bros. Co., Saginaw, Mich., are suitable for furnishing power for operating lights, small pumps, and small electric tools.

The 110-volt dc generators are compound wound to provide better voltage regulation with varying load conditions. The 110-volt ac generators are self-contained, the direct current exciter winder being built into the same frame to make a compact unit. The speed of ac units is 1,800 rpm and dc, 2,000 rpm.

Complete information on these portable light and power plants is contained in literature which those interested may secure direct from the manufacturer.

Unusual Bridge Built Over Albemarle Sound

(Continued from page 5)

by means of metal grid shear connectors. Caps were tied down to the outside piles by overlapping the sway bracing and to the inside piles by special bolted connectors. Inverted channels were bolted to the caps, and to these the steel I-beams of the superstructure were field welded. These beams are continuous over two of the 25-foot spans, but were welded top and bottom at alternate bents to provide partial continuity for a unit consisting of eight span lengths. One span in each of these 200-foot units was tower braced in order to provide longitudinal stability. The concrete roadway slab, 22 feet in width, is continuous for each of the eight-span units, and is tied down to the steel beams by means of a diaphragm at each bent. High curbs and a single bar rail set in sturdy concrete posts afford a serviceable railing which is in keeping with the general character of the structure.

Navigation is served by a 328-foot electrically operated swing span with a concrete filled steel-grid-type floor. This span is carried on a cellular reinforced concrete pivot pier.

Cofferdam

The steel sheet pile cofferdam for this pier was first excavated to the bottom of the mud stratum, 63 feet below water level. One hundred and thirty-eight untreated timber foundation piles were then driven to refusal and the cofferdam backfilled with sand to a depth of 25 feet. A 5-foot tremied concrete seal was then poured, the cofferdam unwatered, piles cut off, and the rest of the pier built in the dry. The original plans for the pier contemplated driving the steel sheet pile cofferdam below water after the pier had been completed. The piles drove so hard, however, that it was decided to eliminate the redriving and utilize the bond between the concrete and steel as a stabilizing influence on the pier. The sheet piles were accordingly cut off about 3 feet above water and capped with a structural steel ring. The cofferdam thus served as a protection against both wave action and scour.

Construction

The north approach, consisting of a 1½-mile trestle, together with the draw span and fenders, was let to one contractor, and the 2 miles of south approach to another. Both contractors began their trestle work on shore and built out into the Sound, while at the same time work was begun on the pivot pier and fenders. Construction was started on the bridge proper in May, 1937, and was completed in July, 1938.

The contractor for the north approach used a floating pile driver equipped with two open-end leads and served by a revolving crane. A crew followed the driver, cutting off, capping and bracing the piles, while other crews placed the steel beams and built forms for the floor slab. Concrete was mixed in tandem mixers mounted on a barge and loaded by wheelbarrow from the material barge tied alongside. A crawler crane on the mixer barge handled and placed the concrete by means of bottom-dump buckets.

The Overhead Pile Driver Owned by T. A. Loving of Goldsboro, N.C., Completing the Framing of a Bent on the South Approach of the Albemarle Sound Bridge and, Right, the Floating Pile Driver Used by the Tidewater Construction Co. of Norfolk, Va., Contractor for the North Approach

U. S. B. P. R. Photos

On the south approach, the contractor used a four-lead overhead driver that, because of its heavy steel runners, can travel on completed bents and reach 25 feet for driving the next bent. When the piles were cut off and braced, a temporary cap was placed. On this cap was an inverted steel channel carrying flanged steel rollers which engaged the steel runners of the pile driver. These rollers greatly facilitated the moving operations and served to keep the driver in exact lateral position. Mounted on the back end of the driver was a steel stiffleg derrick that handled and placed piles from the barge on which they were brought to the bridge site. The derrick also kept the temporary caps moved ahead, while crews followed up putting on permanent caps and steel beams.

Concrete was mixed in a floating plant equipped with a ¾-yard mixer and batching bins loaded by a crawler crane. Mixed concrete was hoisted by elevator and chuted to a convenient point on the completed bridge, whence it was wheeled to the forms in buggies. The considerable amount of wave action in the Sound prevented chuting directly into the forms as was at first proposed.

Both contractors made excellent use of plywood in their form building. This material was cut into panels which fitted neatly between the steel beams and rested on previously set timber joists. Forms for curbs, posts, and rail were also made from plywood, which, when stripped, leaves a concrete surface that is relatively free from board marks. Concrete in the floor slabs was compacted by mechanical vibration and this

(Continued on next page)

Composite-Type Bridge Has Unusual Features

(Continued from preceding page)

operation, together with the neat form work, produced a bottom surface that is particularly pleasing. The tops of slabs were finished according to the present standards for concrete pavement, and the resulting riding surface should be comparable to that of the average paved highway.

Storms Test Structure

During the course of construction, over ½ mile of the bridge already completed and carried on piles 90 to 100 feet in length was subjected to storms of considerable severity. During the height of these storms when all floating equipment was forced to seek shelter, and waves 6 feet high were breaking against the bridge, it showed no appreciable tendency to sway or tremble, and apparently no cracks have developed in the concrete slab. This stability and integrity of the structure is a tribute to the details of design and construction, by means of which piles, beams and slab are made to act together as one unit.

Personnel

The Albemarle Sound Bridge was built with State and Federal funds, at a total estimated cost of $1,338,800.00, under the direction of W. Vance Baise, Chief Engineer, and W. L. Craven, Bridge Engineer, the North Carolina State Highway and Public Works Commission. The survey was made under W. S. Winslow, Hydrographic Engineer, and plans were prepared under T. B. Gunter, Chief Draftsman for the Bridge Department. The north approach, draw span, and fenders were built by the Tidewater Construction Co., of Norfolk, Va., with E. L. Hansen as Superintendent, and the south approach was built by T. A. Loving of Goldsboro, N. C., with E. F. Blankenship as Superintendent. Construction was under the supervision of J. C. Gardner, Division Engineer; J. B. Broach, Associate Construction Engineer; and H. D. Irving, Resident Engineer for the State. Mr. Broach also had general supervision of all creosoting operations, and the excellent results obtained in the treatment of the Douglas fir piling are largely due to him.

Valuable Papers on Asphalt Construction

Five new publications in the Asphalt Institute Construction Series, consisting of compilations of papers presented at the Eleventh National Asphalt Conference, have been made available to readers of this magazine and will be sent to any interested readers without charge, either upon request to CONTRACTORS AND ENGINEERS MONTHLY or direct to The Asphalt Institute, 801 Second Ave., New York City.

Construction Series No. 40 is a 43-page pamphlet dealing with the subject "Soil Stabilization with Asphalt" and Construction Series No. 41 is a 28-page bulletin on Plant-Mix Operations.

Construction Series No. 42 is a 24-page paper discussing the Oregon method of building bituminous macadam, the place of medium-curing asphalt products in plant and road-mix construction, and the selection of asphaltic products for various types of surface treatment.

Construction Series No. 43 is a 24-page bulletin on the control of streams and the prevention of erosion through the use of asphalt.

Construction Series No. 44 is a 12-page bulletin on types of asphalt sidewalks for country highways.

Small Scrapers Used On County Highways

Since the introduction of the Model G Carryall scraper at the Road Show in January, more than 150 of these units have been placed in county service, one county highway department now owning five of them.

The accompanying illustration shows the type of work the Model G scraper is doing in Pike County, Alabama. In this case, the scraper has made the complete highway cut, spread the dirt in even layers on the fill, leaving the grade nearly ready for use and, in addition, has removed the excess material and dumped it over the edge of the fill. Although designed for D6 tractor power, this 6-yard scraper is used by many counties with Fifty or Sixty gasoline tractors.

Grading for a New Highway in Pike County, Alabama

A Lima Paymaster Removing a Rock Slide in Glacier National Park

New ¾-Yard Shovel Named by Contest

The name of the new Lima ¾-yard convertible shovel, dragline, crane and pull-shovel, the Paymaster, is the result of a contest conducted at the American Road Builders' Association Road Show last January by the Lima Locomotive Works, Inc., Shovel & Crane Div., Lima, Ohio. As a shovel this new unit is equipped with an 18-foot boom and 15-foot dipper handle while the standard crane boom is 35 feet, with provision for inserts to make a 50-foot boom.

Among the features of this new excavator are the greater lifting capacities made possible by placing the main machinery at the extreme rear of the revolving frame. The machine revolves around a pintle cast integral with the base. The double-flange roller path is also an integral part of the base casting. Four cone rollers of the hook type operate between the double roller path. The rotating base is a one-piece casting with machinery supports mounted with finished bolts and spot welded. The main clutches are the internal expanding band type and the swing and travel clutches are the double-cone friction type, amply ventilated. Modern welded construction is used extensively throughout the crawler truck. All control levers are within the cab and anti-friction bearings are used at all important bearing points, including the drums.

The boom hoist is independent and fast, and chain or cable crowd can be furnished. The boom is all-steel box-type construction, welded throughout. The dipper handle is a single seamless tube 7 inches in diameter with a single rack welded the entire length of the handle.

New Type Rollers With Water Ballast

A group of variable-weight rollers of the three-wheel type has recently been added to its line of road rollers by the Hercules Co., Marion, Ohio. In introducing these new models, the manufacturer states that a variable-weight three-wheel roller lends itself to a wider range of application without materially increasing the investment.

The weight of the roller is changed by filling the rolls with water and in addition, two large tanks are mounted on the side of the roller frame, carrying additional water and thereby further increasing the weight of the roller, if desired. Aside from the special water ballasted front and rear rolls, there are no changes in the basic design of these Hercules rollers.

New Riveter Booklet

Hanna Squeeze riveters, including machines for squeezing rivets as small as ⅛ inch up to 2 inches and ranging from a 2-inch reach up to 21 feet, are described and illustrated in a 28-page booklet issued by the Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

Copies of this Catalog 227 may be secured by interested contractors and engineers direct from the manufacturer.

Dual-Purpose Spreader Made in Three Models

A new line of spreaders known as Warco-Hartley spreaders, to be built in three models, has been announced by W. A. Riddell Corp., Bucyrus, Ohio. Model H is to be the regular type, Model M is of the transmission type and affords eight different speeds, making it possible to operate it up to a speed of 35 miles per hour, and the third type is the Model M transmission type equipped with an independent motor for driving the disc in spreading exceptionally heavy material such as black-top chips.

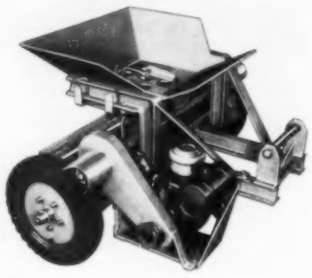
These spreaders are made so that the width and thickness of the spread can be accurately controlled by the amount, speed and position at which the material is fed to the disc, insuring an even distribution of the material from 6 to 30 feet, depending upon the character of the material. The spreader is designed for use behind a truck traveling on the right-hand side of the road, and discharges material behind and to the left of the truck. The discharge is arranged low enough so as not to interfere with passing traffic. An automatic hitch makes possible quick detaching of the spreader from one truck and changing to another.

In territories where there is the long winter fight against ice or hard-packed snow and slippery pavements the Warco-Hartley spreader can be used to spread the necessary sand, cinders, calcium chloride or common salt. It may also be used in summer for spreading calcium chloride or other dust-laying materials, for birds-eye stone or black-top chips, and for agricultural lime or fertilizer.

Road Progress in Peru

One of the most beneficial developments of 1937 in Peru was the results obtained during the first year of a 50,000,000-sol three-year highway program. The 20,000,000 sol allotted to 1937 produced 456 miles of new highway, 48 miles of reconstruction, 166 miles of asphalt surfacing, and 932 miles of other improvements.

The new and improved highways have already opened new markets and the present volume of highway transportation has never been equalled. The use of motor vehicles will certainly increase during 1938, according to the U. S. Bureau of Foreign and Domestic Commerce, as an additional 24,000,000 sol will be invested in highways, several



The New Warco-Hartley Spreader

of which will penetrate populous regions heretofore deprived of economic transportation facilities. All road and bridge tolls have been abolished.

One of the reported projects for 1938 is the construction by the Peruvian Government of some 60 miles of new highway along the River Ocona to provide transportation for the development of a mountain region rich in large gold deposits recently discovered. The lack of transport facilities have hitherto precluded shipment of the necessary machinery and equipment to obtain the ore and transport it to the sea.

New Welding Cleaner

A new compound which is said to reduce cleaning time after welding by 20 to 60 per cent has been announced by the Lincoln Electric Co., Cleveland, Ohio. This new compound, known as Spatter Film, has been developed to increase the economy of electric welding by reducing the tendency of spatter to adhere tightly and by facilitating its removal.

Spatter Film is soluble in water, is non-inflammable and contains no free alkali to injure the hands or harm paint. It is easily applied by means of an ordinary paint brush and can be removed readily for painting. Spatter Film is sold in quart, gallon and 5-gallon cans or in 55-gallon drums.

The New Baker 2½-Yard Hydraulic Scraper

New Hydraulic Scraper

The two outstanding features of the new line of hydraulic scrapers recently announced by the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill., are the flat digging angle and the automatic rear clearance.

If you remember the old-time "mule skinners" handling a slip scraper, you will recall that the main problem was to hold the scraper at just the right angle to secure a capacity load in the least possible time. This is the principle of the flat digging angle feature of the new Baker scrapers. The cutting edge of the pan is held at a flat digging angle, permitting the dirt to pass rapidly to the rear of the pan and loading naturally from rear to front.

Having determined on the proper digging angle, Baker engineers were confronted with the problem of raising the pan to afford ample clearance in hauling and dumping. This was solved by means of powerful springs at the rear of the pan. When the scraper is loading, these springs are automatically compressed when the pan is in digging position. When the load is secured, the springs are released, thus raising the pan for hauling and spreading.

A hydraulic system, operated from the tractor driver's seat, controls all operations. All alloy steel construction is used, combining light weight with rugged strength. The 2½-yard scraper, shown in the illustration, is now in production and other sizes will be available at a later date.

Jahn Moves Sales Office

The C. R. Jahn Co., Chicago, Ill., manufacturer of heavy-duty trailers, has announced that its sales office has been moved to its factory building at 1345 West 37th Place, Chicago.

New Air-Cooled Motor

A new air-cooled 4-cycle gasoline engine, known as Model IBP, has recently been announced by the Briggs & Stratton Corp., Milwaukee, Wis. This new unit, which has a piston displacement of 4.71 cubic inches with a 2 x 1½-inch bore and stroke, is 14 inches high, 10½ inches wide, 11 inches deep and weighs 36 pounds.

Ignition is supplied by a specially designed dust and moisture-proof high-tension flywheel magneto. Other standard equipment includes a Silchrome exhaust valve with alloy steel inserted seat, molybdenum alloy valve guides, aluminum alloy cylinder head, adjustable pneumatic governor, drop-forged crankshaft with ball bearing and oil seal, specially designed float-feed carburetor, gasoline filter, oil-bath air cleaner, screened blower case and a crankcase drilled and tapped for the direct mounting of the equipment. The fuel tank capacity is ½-gallon and the oil reservoir 1½ pints.

The New Jaeger 3½S Speedster

New End-Discharge Mixers Announced

The latest addition to the Jaeger line of end-discharge mixers is the 3½S Speedster, recently announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio. The end-discharge design is claimed to eliminate the need for turning and backing wheelbarrows when discharging and is particularly convenient for backing up to foundations or chutes.

This tilting mixer is powered by the same type of air-cooled engine as is used on Jaeger pumps. The 2½-hp power plant is housed between the drum and the axle for compactness. The mixer is mounted on spring shock absorbers, Timken bearings and pneumatic tires, and has a detachable towing pole for fast trailing and easy maneuvering. Standard Jaeger construction is used throughout, including the patented V spot drum with a cone of Man-Ten steel, mounted on sealed Timken bearings.

R. T. Beebe Dies

R. T. Beebe, President of Beebe Bros., Inc., Seattle, Wash., died on August 23. Mr. Beebe had been associated with his brother, R. H. Beebe, in the firm for twenty years. His son, Frank W. Beebe, and B. B. and D. D. Beebe, sons of R. H. Beebe, are associated with the company, the activities of which will continue under the guidance of R. H. Beebe.

"OPENING IN MARCH", says the banner on this department store job in Highland Park, Michigan. During the danger period before adequate heating was possible, calcium chloride was used in the concrete.

DURING WINTER MONTHS a calcium chloride admixture in the concrete permitted these sewage treatment tanks in Ohio to be placed as one continuous job, since finishing followed placing in rapid order.

CALCIUM CHLORIDE was used in concrete for floors in this Parkside Housing Project, at Detroit. Year 'round construction of many other F.H.A. projects has been facilitated by calcium chloride.

WITH the coming of cold weather, the automobile owner used to garage his car, jack up the tires, drain the radiator and remove the battery. Transportation by auto was "shut-down" for the winter. Today, he puts anti-freeze in the radiator, hooks up the heater and defroster, and operates his car the year' round.

It's the same with concrete construction. Not many years ago, the coming of cold weather meant the end of work. Today, the contractor or engineer simply takes the necessary measures for protection against freezing, then adds calcium chloride to the concrete, and carries on his construction schedule uninterrupted by seasonal weather changes.

That calcium chloride cuts the curing time of concrete approximately in half has been proven by the country's foremost technical authorities and backed up on thousands of concreting jobs. The National Bureau of Standards reports, "At 40 degrees F. the standard portland cement concrete attained the safe compressive strength in 14 days... Upon the addition of calcium chloride, this same strength, at the same temperature, was attained with the standard cements in 7 days." The Bureau found, too, that with calcium chloride in the mix, the three-year strength is "appreciably increased," and that the flow — the measure of workability — is raised from 29 to 41.

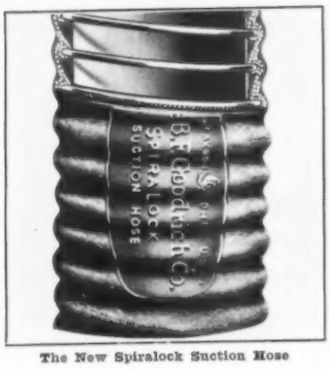
In accelerating the rate of hardening, calcium chloride makes protective measures necessary only half as long, permits early removal of forms, saves labor. In making concrete more workable, forms are filled easier and more completely, a smoother finish is produced, and less pointing-up is required.

Engineers, contractors and building officials who control concreting specifications have made cold weather shut-downs a thing of the past—by including calcium chloride in all concrete placed during cold weather. If you are not already doing so, take advantage of this modern aid to concreting on your present job, your next job. On future jobs, you'll use it automatically.

Write today for complete data on methods of using calcium chloride in dry flake or solution form.

CALCIUM CHLORIDE ASSOCIATION • 4145 PENOBSCOT BLDG., DETROIT, MICH.

CALCIUM CHLORIDE
YEAR 'ROUND CONCRETE CONSTRUCTION



The New Spiralock Suction Hose

A New Suction Hose

A water suction hose with an entirely new type of construction has recently been announced by the Mechanical Rubber Goods Division, B. F. Goodrich Co., Akron, Ohio. Known as the Spiralock, this smooth bore hose is designed for either suction or discharge service and is capable of handling pressures up to 30 pounds per square inch.

The name of this new hose is derived from its construction which consists of locking the fabric around spiral wire inserts, resulting in a hose light in weight and flexible for easy handling and yet durable for the severe service of construction jobs. If the hose is crushed, the wire can be pounded back into position without serious damage. Spiralock suction hose is available in sizes ranging from 1½ to 4-inch and at present is limited to 20-foot lengths with straight or enlarged ends. Where special couplings are to be accommodated, the outside diameter of the ends can be varied by minus ⅛-inch, plus ¼-inch, and the length of the blank ends may also be altered.

New Streamline Crusher

Because of the success of the Universal No. 1016 streamlined jaw crusher introduced recently by the Universal Crusher Co., Cedar Rapids, Iowa, this company has now brought out a new No. 2436 streamlined crusher with a 24 x 36-inch feed opening.

Like the No. 1016, this crusher has a one-piece alloy steel base with a smooth exterior, reinforcement being provided on the inside. It is claimed that this base construction provides a saving of approximately 20 per cent in weight, effecting savings in freight and providing greater portability. The base is flush at the bottom, providing a firm footing, the bolt holes being on the same centers as ordinary models to allow for ready interchangeability.

Other features include six heavy-duty roller bearings, two on the pitman and two on each side; quick-acting product-size adjustment; and a wide feed opening. All major parts are interchangeable with the regular model of Universal 24 x 36-inch crushers.

Seal for Runways At Georgia Airport

(*Continued from page 21*)

feet to permit emergency landings in case of engine trouble at the take-off, as recommended by the Bureau of Air Commerce.

The entire field had to be cleared of a heavy growth of trees and brush before grading could be started. The project was sponsored by the County with WPA labor. Tile underdrains have been laid in all low spots and carried to lateral open ditches at the edge of the field.

A steel hangar for local planes has been erected and is equipped with a rolling door of eight panels, giving a free opening of 80 feet and 18 feet high. The hangar itself is 80 feet square with a lean-to office and work rooms at the back. The entire hangar is well lighted. A concrete apron in front of the hangar is 50 feet deep and flared at the ends for the moving of planes.

Adjacent to the hangar is the Bureau of Air Commerce building which also contains the waiting and rest rooms.

Fertilizing the Grass

In order to determine the best method of insuring a sturdy thick growth of grass over the entire area of the field outside the runways, certain areas have been treated with different fertilizers to ascertain their efficiencies and to aid in deciding whether fertilizers are really needed. Bermuda grass was planted over the entire area but not fertilized. The experimental areas were treated at the rate of 300 pounds per acre with 7-5-5 fertilizer, a fish scrap product, and another section at the same rate with nitrate of soda. The latter gave a quick rich growth of sturdy green grass, while the other showed some benefit. The observations will be continued for some time to determine whether the nitrate was a flashy growth or whether the runners which showed up immediately will spread the grass over the bare spots and speed up the covering of the entire area. It is thought also that the fish scrap fertilizer may be slower in action and may in the long run show to better advantage than it has so far. It is also possible that since the entire field a little over a year ago was covered with a thick growth of trees and brush there may be a sufficient amount of natural humus in the sandy soil to support the grass with a reduced quantity of fertilizer. Only a longer period of observation can give the complete answer to this problem so the motto at the Airport now is "Wait and see." Other airport officials are also watching this experiment with a great deal of interest after having spent considerable money in plantings that did not produce satisfactory turf.

Personnel

The operation of the Malcolm McKinnon Field is under the direction of Harry Smith, Airport Manager, while the construction and the experimental work underway and described in this article is under the supervision of H. J. Friedman, County Engineer of Glynn County, Brunswick, Ga.

Safe Clearing Operations

Clearing of trees and brush at the site of large construction and road-building projects results in many injuries, according to "Construction Safety" published by the Construction Section of the National Safety Council. By planning the work, carefully selecting the men and instructing and supervising their activities few injuries will occur.

Men must be taught the safe way to sharpen, carry and use sharp tools. Before felling trees, underbrush and vines should be removed. Dead trees should be taken out before cutting live ones. Eye injuries and scratches can be prevented through care in handling material. When trees are about to fall, men should be warned by loud signals to stand clear.

New Spreader Used For Retread Paving

(*Continued from page 13*)

road as it existed for the use of the finisher operator in following with the guide on the machine. No tack coat was used on the old pavement which was a surface treatment over a gravel base. Base or leveling course was laid for one mile and opened to traffic immediately after the 7-ton Austin roller had further compacted it. The full 20-foot roadway was covered by two strips with a clean level joint between them. A raker followed the machine down the road to take care of any momentary irregularities in the joint due to a slight deviation of the machine as controlled by the operator. When laying down the second strip the operator used the first strip as a guide instead of again setting the line with a string. Top was placed as soon after the base as was feasible, usually the following day.

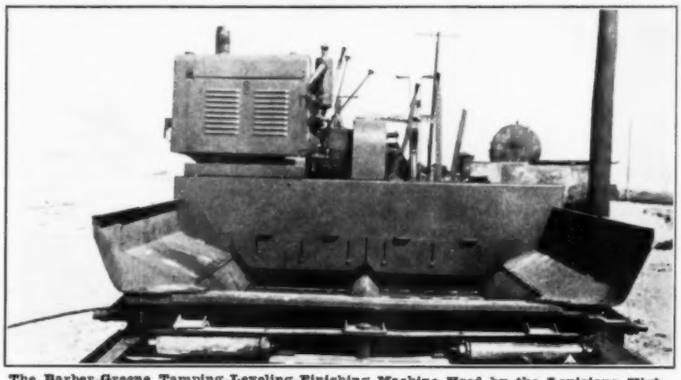
On this job the machine has handled 341 tons of leveling course material in a 10-hour day, spreading a strip 10 feet wide and 2,350 feet long. On the surfacing course it has placed 339 tons of 4,900 feet of 10-foot strip. This included turning the machine back to lay the second 10-foot strip alongside the first so as to leave the pavement complete from shoulder to shoulder insofar as possible.

In the first part of the work a sand seal was tried but it was found that it served no useful purpose so was abandoned. No bituminous seal has been used as yet as the work was over an old asphalt surface which it was felt would seal the new work against water from below. In the course of a few years some form of surface seal with asphalt may be tried. It remains to see the way the new smooth surfacing stands up under the rains with the heavy traffic carried on this main east and west highway.

Organization for Work

The organization used by the State for this work consisted of a Superintendent in charge of the work, a Resident Engineer responsible to headquarters for the carrying out of the specifications, a Laboratory man to check the mixes regularly, a timekeeper and bookkeeper, two mixer men on the Barber-Greene mixer, two men on the Barber-Greene finisher, one crane operator, one fireman on the steam boiler, one roller man, and from twelve to fifteen laborers.

The work was done under the direction of J. F. Pierson, Construction Engineer with L. A. Ellis as Resident Engineer and E. H. McLendon, Superintendent.



The Barber-Greene Tamping-Leveling-Finishing Machine Used by the Louisiana Highway Commission for Retread Paving

The 1939 A.R.B.A. Convention will be held March 5-11 in San Francisco.

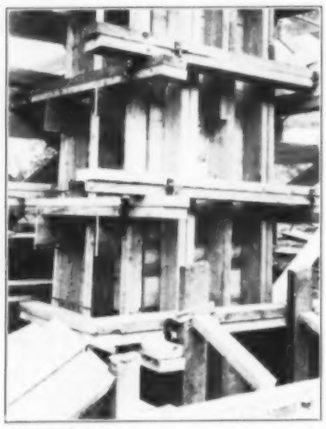
News From Heil Company

The Heil Co., Milwaukee, Wisconsin, has moved its Buffalo Branch to larger quarters at 2139 North Fillmore Avenue. Karl Maas, formerly a member of the Heil sales organization at the New York branch office, is now in charge of the Buffalo branch.

Jack Davies, Southeastern District Manager, who has been located at Baltimore, Md., will move his headquarters to Atlanta, Ga., and will have charge of sales of Heil hydraulic dump units, transportation tanks and hydraulic scrapers in Louisiana, Mississippi, Alabama, Tennessee, Georgia, Florida, North and South Carolina and Virginia.

Pfeifer of Chain Belt Dies

Carl L. Pfeifer, Treasurer of the Chain Belt Co., Milwaukee, Wis., died suddenly in August while on a business trip to Philadelphia. Mr. Pfeifer, who joined the Chain Belt Co. in 1914, had held the position of treasurer since 1916.



C. & E. M. Photo
Details of Forms and Ties on Column 3 of Pier 3

High Overpass Carries Highway Over Railroad

(Continued from page 2)

in elevation amounts to about 9 inches for the grade and the length of caps used on this overpass.

The structure is designed for an approach roadway of 20 feet with two 6-foot shoulders and a 2½-inch mixed-in-place surface of crushed gravel and tar. The overpass itself has a 24-foot roadway consisting of a 7-inch concrete slab and there are no sidewalks. The backfill around the open abutments is carried down with a 1 on 1½ slope in front.

The side curb of the roadway is 12 inches high and sloped back 1 inch. A feature of this curb, and used generally in Vermont structures, is the wind slot in the curb. This is 5½ inches high and approximately 3 feet long, with two such slots between the main posts. The slots drain vertically underneath the curb through vertical 4 x 6-inch holes. In order to protect the I-beams from the water running along the under-surface of the floor and getting between the concrete and the flange of the beams, a notch is made in the under part of the floor a few inches from the curb slot drains which prevents the water draining beyond that line.

At the railroad crossing and at the abutment piers the water is carried along the wind slots to drain clear of the structure and not mar the piers by deposits of salts on the face of the concrete. These wind slots are roadway scuppers as well as relief openings to reduce the wind pressure on the structure. Blast plates were welded to the bottom flange of the I-beams along the middle span of the structure where it crosses the railroad. These plates are of wrought iron and measure 16 inches wide, ⅞ inch thick and 20 feet long. At the south end of the structure are drop inlets for drainage of the entire southern end. A 12-inch Armco corrugated-iron asphalt-coated pipe carries the drainage away from the structure. The concrete overpass is 320 feet long.

Footing Excavation

All of the footing excavation at the south end was done with a ⅝-yard Lorain shovel which worked its way up to the point of excavation, dug the hole, backed out and was on its way to the next hole in a short time. In fact all the open excavation for all the footings was done in one day by the small shovel, down to the last foot of excavation which was done by hand. On the north end where the ground was in the slope of the hill the footing excavation had to be done entirely by hand and was sheeted. The footing excavation on the south end ran from 4 to 6 feet in depth and on the north end 4 to 8 feet. The ground consisted of sandy loam, sand-clay and medium-hard blue clay.

For the footings of piers 2 and 3 adjacent to the single track of the Boston & Maine railroad all the excavation was done inside the wood sheeting. The footings were excavated alternately with 1, 3 and 5 being dug first, concreted and backfilled and then 2 and 4 completed. This prevented undue disturbance of the ground adjacent to the track. The sheeting used was plain 2 x 6 lumber hand-driven and with 4 x 8 wales inside and cross-braced above the bottom tier at 4-foot intervals.

Form Work

The forms for the abutment and pier columns was all random width 1-inch stock ranging from 6 to 8 inches wide. The studs were all 2 x 6's and the wales double 2 x 6's with ribbon ties, furnished by Universal Form Clamp Co., used outside the forms, attached to the ends of the wales so that there was no cutting of the ribbons inside the concrete after the forms were stripped and then carefully pointing up the holes and rubbing again to a uniform surface. The forms were all of panel construction so that they could be used repeatedly on the similar columns with some cutting for the shorter columns. The pier forms were cross-braced with lumber and also braced to the ground laterally.

A total of 40,000 feet BM of lumber was used for the forms and the high scaffolding for the concrete runways for this short job.

Concreting

The concrete plant was set up on the north end of the structure on the hill just beyond the end of the north abutment so that the concrete could be chuted directly into the buggies and pushed along the runway to the forms and piers. A one-bag Smith mixer was used and the aggregates weighed out on Johnson wheelbarrow scales. The runway was above the top of the abutment and pier columns and between the north abutment and No. 1 pier. The concrete was spouted through 4-foot lengths of 6-inch diameter vertical pipes to the right to the abutment and to the left to the forms of pier 1. Then with a continuation of the runway it was possible to pour the remainder of the piers from the same set-up without moving the mixer.

Quantities

The length of Project FAGH 112 was 1.600 feet or 0.303 mile.

Solid rock excavation	900	cubic yards
Common excavation, including borrow	26,100	cubic yards
Structure excavation	839	cubic yards
Subbase gravel	2,000	cubic yards
Crushed gravel, mixed-in-place surface with tar	210	cubic yards
Refined tar	4,570	gallons
Concrete Class A, (1:2:4)	829	cubic yards
Reinforcing steel, concrete	136,675	pounds
Structural steel, I-beams	263,811	pounds
Contract bid		$54,491.89

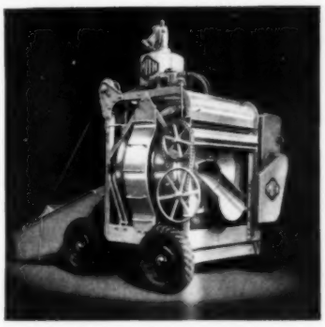
Personnel

The overpass at the crossing of the Boston & Maine Railroad and U.S. Route 5 just north of Newbury, Vt., was built by Ryan & Densmore of Claremont, N. H., with Frank King as Superintendent. For the State Department of Highways of Vermont the work was under the direct charge of W. H. Chase as Resident Engineer. Hubert E. Sargent is Commissioner of Highways and Chief Engineer of the Vermont Department of Highways.

Want any information on equipment? Write the Editor.

Conference Date Changed

Announcement has just been made by The Asphalt Institute that the Twelfth National Asphalt Conference will be held in Los Angeles during the week of February 27, 1939, instead of the previous week as originally announced.



The New Smith Mixer

A New 14-S Mixer

A new 14-S non-tilt mixer in four-wheel end or side-discharge models has recently been announced by the T. L. Smith Co., 2857 N. 32nd St., Milwaukee, Wis. This new machine is claimed to incorporate many features which speed up all three phases of the batch cycle, loading, mixing and discharging.

Like all Smith mixers, it has an end-to-center mixing action, with ten full-width buckets continually working the batch from the ends to the center. The drum is unusually narrow with an extra large diameter and large drum openings. The machine is of sturdy all-steel construction, compact and light in weight.

Other features of these new mixers are single center gear ring and roller tracks, drum rollers turning on dust-proof Timken roller bearings, enclosed gear reduction, multiple V belt drive, outside band clutch and skip brake, oversize streamline skip equipped with automatic skip vibrator, accurate syphon-type water tank, auto-type steering, spring-mounted axles, and anti-friction bearings throughout.

A Pressure Regulator For Compressed Air Pipe

The new model of the Dockson regulator for reducing and stabilizing air pressures accommodates incoming pressures from 10 to 500 pounds per square inch and will deliver pressures ranging from 1 to 125 pounds per square inch. The internal mechanism of this Model 38 regulator is of interest as the seat of the regulator operates with, rather than against, the incoming pressure. Because of this, it is possible to use a semi-soft seating material that permits accurate operation and at the same time prevents creepage due to the fact that dirt or foreign particles becoming lodged on the seat are imbedded by the nozzle pressure, thereby making a tight fit.

The cloth impregnated rubber diaphragm gives a constant outgoing pressure when used in conjunction with this type of seat. The manufacturer, the C. H. Dockson Co., 2835 East Grand Blvd., Detroit, Mich., states that for the most efficient operation the maximum outgoing pressure should not exceed 80 per cent of the incoming pressure. There is, however, no restriction of the minimum outgoing pressure.

New Lantern Globe Less Easily Broken

A new type of lantern globe called the Lite-Gard has been placed on the market by Detroit Metal Products, Inc., Detroit, Mich. It differs from the earlier styles of lantern globes in that instead of being made entirely of glass it consists of a steel housing with three glass bulls-eyes equally spaced around its circumference, so as to give good visibility in all directions, regardless of the position of the lantern. The combination of steel housing with bulls-eye lenses makes it practically indestructible as compared with the all-glass type. Furthermore, the bulls-eye makes the lantern more attention-compelling. This globe fits all standard lanterns using small size globes.

Shasta Dam Started

Work has begun on Shasta Dam in California, the second largest concrete dam in the world, by Pacific Constructors, Inc., a twelve-company syndicate which was awarded the main dam contract for $35,939,450.00 a few weeks ago. The contractor has already opened a field office in Redding and has employed about 500 men in the preliminary building of access roads, clearing the contractor's construction site in the Sacramento River Canyon, and excavating for the east abutment.

The dam will create a reservoir with a gross storage capacity of 4,500,000 acre-feet, storing water of the Sacramento, Pit and McCloud Rivers. The reservoir will be operated for purposes of navigation improvement and flood control in the Sacramento Valley, irrigation in both the Sacramento and San Joaquin Valleys, salinity repulsion in the Sacramento-San Joaquin delta, and electric power generation for northern California.

The general contract upon which construction is ordered to start is for performing all work, including furnishing labor and equipment, for building the dam and power plant under the supervision of U. S. Bureau of Reclamation engineers. The contract allows 2,000 calendar days, or about 5½ years, for the completion of the work.

Pacific Constructors, Inc., is made up of the following large contracting firms: The Arundel Corp., Baltimore, Md.; Foley Bros., Inc., New York City; A. Guthrie & Co., St. Paul, Minn.; Hunkin-Conkey Construction Co., Cleveland, Ohio; W. F. Callahan Co. and Gunther & Shirley Co., Dallas, Texas; Shofner, Gordon & Hinman, Denver, Colo.; Lawler & Maguire, Butte, Mont.; Griffith Co., Metropolitan Construction Co., American Concrete & Steel Pipe Co., D. W. Thurston Co., and L. E. Dixon Co., all of Los Angeles, Calif.

New Blasting Agent

A new grade of Nitramon blasting agent, with all the safety advantages of the regular Nitramon and to be used in the same way but which is slower than the regular grade, has been announced by E. I. du Pont de Nemours & Co., Wilmington, Del. This new grade, called Nitramon No. 2, is sufficiently sensitive for quarry blasting and is particularly adapted to soft limestone and as a top load in harder material.

The density of Nitramon No. 2 is great enough that it will sink in water holes and it has a strength equivalent to 40 per cent ammonia dynamite. Its velocity is 10,000 feet a second. It is packed in cans, similar to the regular grade except that the lids are black with white letters. Water resistance is indefinite provided the cans remain intact. Nitramon is non-freezing.

New Diesel Tractor Announced for Fall

The International Harvester Co., 180 No. Michigan Ave., Chicago, Ill., has announced a new TD-18 TracTracTor which will go into production this autumn, after four years of intensive engineering tests and field work.

The flexible power of the 6-cylinder diesel engine, with 70 drawbar horsepower maximum, combines with a six-speed transmission to provide a power and speed of every type of job. Long track ground contact and approximately 21,000 pounds of weight provide traction to match the power of the engine and the requirements of heavy-duty operation.

An attractive folder giving the specifications of this new tractor has been issued by the International Harvester Co., which will be glad to send copies on request.

The New Trojan 43-Yard Truck

World's Biggest Truck Powered with a Diesel

A 43-yard truck, the largest in the world, powered by a 180-hp Caterpillar diesel engine, has been built by the Trojan Truck Mfg. Co., Los Angeles, Calif. An especially designed tail-gate makes it possible to load the unit to its maximum capacity, regardless of the type of material being handled. It unloads in 45 seconds by means of a sliding bulkhead in the body that pushes the load out and spreads it simultaneously.

The diesel engine is an 8-cylinder V-type unit with a 5¾-inch bore and an 8-inch stroke. Turning at 1,100 rpm, it develops 180 maximum horsepower. The transmission is a unit-power type having three speeds forward and one speed reverse. An especially constructed auxiliary transmission has an overdrive, underdrive and a direct drive. The overdrive ratio provides an increase in speed of 40 per cent over that of the direct drive, giving a maximum speed of 25 miles an hour empty and 15 miles an hour loaded to full capacity. The underdrive ratio provides a 2-1 reduction, allowing ample pulling power on average grades.

The truck is a twelve-wheel drive with two sets of triple-tired wheels in the rear. There are fourteen demountable-type disc wheels, 24 x 12 inches, having bolt-circle diameters of 14½ inches. The tires are 13.50 x 24-inch Firestone Ground Grip 20-ply excavator-type treads. This machine worked 120 hours on flood control work in Los Angeles, moving about 9,000 cubic yards. The hourly fuel consumption for two 42-yard loads an hour on a 2½-mile round trip averaged 3½ gallons of 5½-cent fuel.

New Explosives Carrier

The new M.S.A. explosives carrier No. 12, recently announced by the Mine Safety Appliances Co., Pittsburgh, Pa., is a container of Bakelite, non-conductive of electricity and moisture-proof, to provide a convenient and safe means of carrying explosives or detonators. It is equipped with an adjustable web carrying strap with eyelets through which locks may be inserted if such a precaution is necessary. The container is kidney shaped so that it may be carried comfortably and has a capacity of twelve dynamite sticks each 1¼ x 8-inch in size. Its capacity for detonators ranges from 34 to 60, depending on their size and shape.

A new bulletin describing and illustrating this new explosives carrier as well as the M.S.A. shot-firing units may be secured by those interested direct from the manufacturer.

New Osgood Distributors

The Osgood Co., Marion, Ohio, has announced the appointment of the following distributors to handle the complete line of Osgood power shovels and truck cranes: C. B. Skinner Co., New Orleans, La.; Morton & Morton, San Antonio, Texas; Rome Tractor Sales Co., Rome, N. Y.; A. L. Crow Road Machinery Co., Birmingham, Ala.; Industrial Machinery Co., Kansas City, Kans.; and W. A. Akhurst Machinery Co., Ltd., Vancouver, B. C.

New All-Purpose Trailer

A new six-wheel all-purpose trailer, designed for the transport of machinery or materials up to 48,000 pounds, has just been announced by the C. R. Jahn Co., 1345 W. 37th Place, Chicago, Ill. Among the features of this new unit is the same ease of loading available on all other Jahn trailers.

This easy and fast loading method is made possible by the unique construction of the front end of the trailer frame, which serves as both a connection and turntable for the front axle and permits the entire front axle assembly to be removed. Loading is also made easy by means of a heavy jack screw built into the coupling assembly, which raises or lowers the trailer frame to accommodate all jobs with safety.

Two rear-axle arrangements are available on this new trailer, either tandem or dual oscillating types, and all wheels are equipped with heavy-duty full-balloon pneumatic tires. Standard equipment includes adequate loading ramps, lash rings riveted to side frames, heavy drawbar safety chains, reflectors, stake pockets and flag sockets. This new front-end loading trailer conforms to all state regulations covering overall lengths, widths and wheel designs.

Paine Announces Firm For Consulting Practice

Clifford E. Paine, formerly associated with the late Joseph B. Strauss in the firm of Strauss & Paine, Inc., and principal assistant engineer of the Golden Gate Bridge during its design and construction, has announced that he will continue his practice of engineering under the name of Clifford E. Paine & Associates, Inc., with principal offices at 176 W. Adams St., Chicago, Ill.

The associates in the company include Charles H. Clarahan, Jr., Dwight N. Wetherell, Richard K. Strauss, and others of the engineering staff which Mr. Paine has headed for many years.

For Your Weighty Problems

This is the title of a new folder, recently issued by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif., describing the advantages of lifting and carrying heavy loads with tractor power. It relates how many contractors have cut the cost of numerous lifting jobs by using one of their tractors and a LeTourneau crane, a unit with the mobility of a tractor and lifting power up to the capacity of the tractor engine, transmitted through a standard LeTourneau power control unit.

Copies of this 6-page illustrated booklet may be secured by those interested direct from the manufacturer.

New Core Drill Bit

What is claimed by the manufacturer as a revolutionary type of core drilling bit has recently been announced by the Sullivan Machinery Co., Michigan City, Ind. This new bit, known as Koebelite Korbit, consists essentially of a number of borts-bearing inserts accurately located and firmly brazed into radial slots in the face of the bit blank. By means of a process developed and patented by C. J. Koebel of Detroit, the stone-bearing insert or metal matrix and the stones are moulded and integrally bonded together. Because of the manner in which the stones are set in the inserts, a uniform contour gage is achieved which gives maximum cutting speed and insures a straight hole.

Literature describing these new bits, which are available in any style and size, may be secured by those interested direct from the Sullivan Machinery Co.

New Hercules Dealers

The Hercules Co., Marion, Ohio, has announced the appointment of the following distributors to handle the sales of Hercules road rollers and Ironerolls in their respective territories: J. B. Hunt, Raleigh, N. C.; Rathman Equipment Co., Rapid City, S. D.; Rome Tractor Sales Co., Rome, N. Y.; Webster & Hedgcock Tractor & Equipment Co., St. Louis, Mo.; S. G. Hawkins, Houston, Texas; Neil B. McGinnis, Phoenix, Ariz.; J. C. McNeilly, Columbus, Ohio; and Mussens, Ltd., Toronto, Canada.

Dead-End Highway Has Great Future

A Vision Becoming Reality On Daniel Webster Highway Connecting with Canadian Artery to City of Quebec

(Photo on page 36)

✦ AN idea, a long roundabout motor trip into Canada, a wearisome hike through rough forest country, a long conference with a large land owner, selling the idea in Washington, and now the New Hampshire Highway Department looks forward with enthusiasm to the opening of the 9 miles of road from the northern end of the Daniel Webster Highway north of Pittsburg, N. H., to the Canadian border late this year. It is only a low-grade truck trail as it is being opened at present but it is the beginning of a stage construction project that yet may well be the model for a new type of highway for the future, for New Hampshire holds the gift deed for a 1,000-foot right-of-way for the full 9 miles of this road through a timber and hunting paradise. The St. Regis Paper Co., owner of very extensive timber tracts in this section, gave the right-of-way to the State.

This peninsula-shaped section of New Hampshire, jutting north of the adjoining State of Vermont toward the Quebec line, is the fountain head of the Connecticut River where in three lakes the longest river in New England is born.

Aerial Photographs Sell the Idea

After the area had been looked over by officials of the New Hampshire Highway Department a set of aerial photographs was made, showing the entire area through which the proposed truck trail would run. These aided both in selling the idea of the gift deed to the owner and in actually deciding on the location of the roadway itself. Then when it came time to get Federal financing for the project the same aerial photographs were again potent arguments for the project.

We have not heard of the use of aerial photographs to such an extent on any other state highway projects although the Federal departments have used them considerably in rough terrain in the west. The final survey for the work was completed in 1933 by the Highway Department of New Hampshire so that the final plans could be placed before the proper departments in Washington. At the time the surveys were completed it was possible to drive only to the Second Connecticut Lake where a hunting and fishing lodge was located. By the end of the 1938 season, it is expected that the trail will be open to the Canadian border although it will not be ready for auto traffic before the summer of 1939.

CCC Does the Work

A Civilian Conservation Corps camp was established in the vicinity and for three years they have been hard at work breaking through the trail, a 10 to 14-foot road, with turn-outs, and will complete its contribution to the highway system of New Hampshire this year. The camp has averaged about 175 men throughout the seasons when work has been carried on.

The roadway is drained solely by side ditches and concrete pipe culverts with stone masonry headwalls of local stone. The line of the road follows closely the Connecticut River valley so as to provide as economical construction as possible with a minimum of excavation.

The Future of the Project

With the actual opening of this road close at hand the State of New Hampshire has started on a stage construction project which offers many opportunities for future development. The first that comes to the engineer's mind is the improvement of the road for constant use during the summer for all motor traffic. It is doubtful that it would be wise to consider this for the immediate future, but rather the section should be allowed to develop for some time as a sportsman's country with the new road serving followers of outdoor sports from both sides of the border. With the 1,000-foot right-of-way the Highway Department can develop through the cooperation of other state agencies camp sites under the control of the State and thus create a possible new sports center within the State rivalling those already established and sought so eagerly by thousands each year both in summer and winter.

The construction and maintenance of highways in New Hampshire is under the direction of Frederic E. Everett, Commissioner, J. Harold Johnson, Deputy Commissioner, and Daniel H. Dickinson, Chief Engineer.

New Concrete Vibrator For Highway Pavement

A new highway concrete vibrator incorporating a number of new features was recently announced by the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill. This new vibrator can be attached to any make of concrete finishing machine. A single unit can be furnished to vibrate pavements up to 12 feet in width and a double unit is available for pavements up to 20 feet in width.

Power is furnished by two 3-hp gasoline engines which are equipped with automatic clutches and high-speed countershafts. The power developed by these engines is transmitted to the concrete paving vibrator tool by means of heavy-duty flexible shafting.

Features claimed for this new unit, which is adjustable for vibrating crown or straight pavements, include the fact that the highway slab is surface finished with one pass of equipment; the two vibratory elements furnish double the energy to compact the concrete; vibration is placed evenly along the forms without pushing the concrete over the edges; complete vibration is given to the subsoil or base; the vibrating tubes are lifted vertically out of the concrete, permitting thorough vibration near the expansion joints; and the unit is simple in construction, easily serviced and light in weight. The vibrating tube, because of its small diameter, is readily immersed and pushed through the concrete which rolls over the vibrating tube for its entire length. Vibration dampeners prevent the vibration from entering the finishing machine and thereby causing damage. The vibration effort in the concrete is applied in all directions due to the slant of the transverse vibrations, and therefore there is an even vibration effort over the entire width of the pavement.

New Type Arc Welder

New atomic-hydrogen arc-welding equipment, particularly suitable for the welding of special alloys and thin sections difficult or impossible to weld by other methods, has been announced by the General Electric Co., Schenectady, N. Y. This new equipment is particularly adapted to fusion welding, producing a uniformly strong weld, free from porosity, and with a smooth appearance. Some of its specific applications are the addition of a different metal for hard surfacing, building up broken or worn sections of tools, and the welding of light-gage stainless steel.

In atomic-hydrogen arc welding, an alternating current arc is maintained between two adjustable tungsten electrodes, and at the same time hydrogen gas is fed to the arc and around the electrodes. The hydrogen molecules which are subjected to the intense heat of the arc are broken up into atoms, the majority of which, recombining outside the arc zone, in contact with the work, liberate heat in excess of that obtainable from a gas flame or an electric arc alone. The remaining atomic hydrogen provides an active reducing atmosphere which prevents oxidation and other contamination of the weld metal, reduces surface oxidation on the parent metal, and protects and cools the electrodes.

The new G-E equipment is combined into a compact portable unit. Convenient terminals and pipe fittings allow ready connection to the electrode holder, to the power supply and to the hydrogen source. For hand welding, the familiar rod-type electrode holder with suitable power and hydrogen connections is furnished and for automatic welding, equipment with either a single or multiple-arc head can be supplied.

Spreading Mixed Material on a Highway in Chautauqua County, N.Y.

Use Business Methods In County Road Work

(*Continued from page* 17)

and then use it as a rough guide to be modified for exceptional conditions. If in addition we choose a type of pavement adaptable to stage construction and thus get a large mileage of usable roads quickly, these roads will at once begin to earn their own money for future improvement and this further improvement can be effected without loss of original investment. In this way, we guard against the big mistake of building a pavement too expensive for the traffic it has to carry, a mistake made often in the past due to the fact that no study of highway economics had been made.

Using Local Materials

If we are to build secondary roads anywhere cheaply, it follows that we must use the local materials at hand or the roads will not be cheap. In Chautauqua County and in most of New York's southern tier of counties there is no good hard native rock.

Highway authorities said for years that these counties had no suitable road-building material available. There is, however, considerable creek gravel and some glacial gravel pits of limited quantity which are too small to warrant setting up a processing plant at the pit. These pits contain some hard particles but also have a considerable percentage of soft sandstone or shale produced by the weathering of native rock. Various attempts to use local materials in years past resulted in failure. If we were to build cheaply, the problem became one of learning to use the local material for the greater part of the pavement so that it would be necessary to import only as much as needed for the thin top wearing surface.

Our Class B gravel roads soon attracted so much traffic that they became difficult to maintain as gravel roads. Chemical treatment with chlorides helped but the gravel was soft and the treatment rather expensive so that we did not attain as much success in this way as did those localities where the gravel was harder.

Thus necessity led us to the development of special machinery and methods of construction of bituminous tops that are very effective and economical. As far as I am aware, these methods as a whole are used nowhere else in the world. We load run-of-bank gravel on dump trucks by power shovel, spread it on a windrow of proper size on the previously stabilized subgrade, pick up the windrow with a spiral-feed bucket elevator, screen it with a vibrating screen into two or three sizes as desired, chute the oversize on a belt conveyor feeding a traveling crusher which follows behind at synchronized speed, the run-of-crusher material is dropped on the road and windrowed with the medium size, ¼ to 2-inch. Some of the sand which was deposited on the shoulder by the chute is also pulled into the windrow if the gradation shows it to be desirable. Behind this operation comes a traveling bituminous mixer which again picks up the prepared aggregate with a spiral-feed bucket conveyor, weighs it, batches it with the proper amount of bitumen, mixes it in a pugmill, drops it on the road to be spread out with a one-man power grader and rolled into place. Later it is given a seal coat and cover, preferably in two lift applications, using the sand to choke the first light application and a hard pea-sized imported crushed stone or slag cover for the second as a non-skid wearing surface. In this way, with cheap local material, we obtain a pavement comparable to that produced by the stationary plant cold-mix at a much lower cost, usually 26 to 30 cents per square yard for 2-inch top.

As much as 4,400 feet a day has been laid but the average speed for all the days worked during a season is about one-third mile a day. It is best to plan that work so that it can be done during the dry months of late May, June, July, August and early September.

This method required not only the development of an untried method which was worked out piece meal as we went along, but it also required the design and assembling of such new machinery as the traveling crusher with belt feed, traveling under its own power. This was assembled in our own shops. Also it was necessary to change the design of the bucket elevator, screen and other parts.

Soil Studies

In Chautauqua County we have tried to keep up with the times in the use of soil stabilization and have established a small inexpensive soil-testing laboratory in order to do so.

Frost Boils

If the capillary water in the subgrade of a road can be prevented from coming up under the pavement by some scheme such as putting a thin waterproof layer down in the subgrade below the frost line, or as low as it is feasible to get it, then there will be no formation of ice, no frost boil and no spring break-up. In 1932 we tried this scheme on bad spots on two or three roads in our county. It seemed to work so more of it has been done. In the last few years we have given a bituminous treatment of about 0.4 gallon per square yard to the subgrade of all Class A or Class B roads before laying the gravel foundation. In extremely bad spots, a larger quantity of bitumen was used and disked into the subgrade for a depth of 2 to 6 inches, depending on conditions. This scheme of stabilization has worked and the expense is not out of proportion to the benefits.

Treating Subgrade with Bitumen

Another reason for the treatment of subgrade with bitumen is that it prevents fine capillary soil being churned up into the gravel foundation by traffic, thereby destroying its bearing power, and also stiffens and stabilizes that portion of the subgrade immediately under

(*Continued on next page*)

The Silver King Jack

Heavy-Duty Jacks

Simmons Model T-30 Silver King jacks, made by the Simmons Mfg. Co., Ashland, Ohio, are built for heavy-duty work. The rigidity, pyramid design and one-piece construction of these jacks are designed to provide safety, quick action and easy handling of heavy loads. Although rated at 30 tons, these jacks have often lifted more than 60 tons with but slight pressure on the lifting handle, according to the manufacturer.

The unit is a rugged one-piece malleable iron casting, with the body cast integral with the base. A steel ram, ground to a tolerance of 1/1,500 to 1/2,000 inch, prevents loss of power. The oil reservoir is enclosed by a heavy malleable iron body. A strong two-piece pumping handle is furnished with each jack and a carrying handle cast integral with the body makes the jack easy to move about.

These jacks, which can be worked horizontally as well as vertically, are described in literature which the Simmons Mfg. Co. will be glad to send on request.

A New Truck Crane With Welded Boom

The new Universal truck-mounted crane recently announced by the Universal Crane Division of the Thew Shovel Co., Lorain, Ohio, has been designed especially for bridge builders, sewer contractors and steel erectors and riggers. The machine has a capacity of 26,000 pounds at a 10-foot radius in all directions, with outriggers set, and without outriggers will handle 23,300 pounds over the back and 21,700 pounds over the side at a 10-foot radius, according to the manufacturer.

The unit is equipped with an all-welded boom which is made in a basic 25-foot length consisting of two 12½-foot sections. Suitable center sections are available to extend the boom to a maximum length of 80 feet. Tip extensions are available for greater boom lengths up to 110 feet or longer. The new boom is of the pin-connected design. Each splice is formed by four clevis and pin connections. There are no bolts used at the splices; simply four pins to drive home. This ease in boom assembly enables a quick change in boom lengths so as to utilize the boom length most suited to the particular job.

Another feature of the new boom is the boom lacing which, instead of being formed of individual pieces or lattice bars, is formed of a single continuous bent angle running the full length of each boom section, providing maximum strength at minimum weight. Boom derricking and lowering are both power controlled. A special steel erector's precision boom hoist, operating through a positive ratchet and pawl on the end of the hoist shaft, gives positive power control of boom-lowering operations through a wide range of lowering speeds.

In addition to this 13-ton heavy-duty model, the Universal-Lorain line includes all-purpose truck cranes and shovels in 6½ to 8½-ton crane capacities and ⅜ to ¾-yard shovels.

Complete information on these new truck cranes as well as on Thew Lorain excavators may be secured direct from the manufacturer upon request.

More County Roads For Fewer Dollars

(Continued from preceding page)

the gravel foundation. The surface of a pavement must be strong and tough enough to resist wheel wear and traffic strains but immediately beneath the top layer of pavement the wheel pressure begins to spread out over a larger area than that of actual contact of wheel and pavement. The deeper you go into the pavement, the more this wheel pressure spreads out and the less the intensity of pressure on that layer of pavement or foundation. If a pavement is to stand up, this wheel pressure must be finally spread out until, when it reaches the subgrade, its intensity does not exceed the bearing power of the subgrade. If we can stabilize the top layer of the subgrade just beneath the pavement foundation and increase its bearing power just a little for a depth of 2 or 3 inches, we have practically increased the effective thickness of the pavement. This can be done quite effectively by a mixture of bitumen with the native soil. Quite probably there are other materials which will waterproof a layer of subgrade cheaply or destroy the capillarity of its pores and make them water repellant. If the moisture content can be kept within reasonable limits by some such inexpensive chemical or material, the subgrade will retain its summer strength throughout the year.

From a paper presented at the 1938 Annual Meeting of the Association of Highway Officials of the North Atlantic States at Atlantic City, N. J.

New Self-Priming Centrifugal Pumps

Two new self-priming centrifugal pumps, one of aluminum alloy and the other of semi-steel, have recently been announced by the Sterling Machinery Corp., 411-13 Southwest Blvd., St. Louis, Mo.

Model LTL, a 2-inch light-weight pump constructed of aluminum alloy and weighing 100 pounds, is rated at 150 gpm at a 10-foot head, 140 gpm at a 20-foot head, 115 gpm at a head of 30 feet, 80 gpm at a 40-foot head and 40 gpm at a 50-foot head. It is equipped with a Lauson single-cylinder four-cycle air-cooled engine with high-tension magneto, mechanical governor, automotive-type carburetor and ball-bearing crankshaft.

Model LT, of semi-steel construction and weighing 140 pounds, is powered by the same type of engine and has the same ratings. The manufacturer states that for both these models the ratings are conservative and actual tests showed greater capacities operating at higher heads than the official ratings.

A new bulletin containing further details on these two new pumps may be secured by those interested direct from the manufacturer.

New Drilling Machine

The new Star No. 75 Spudrill recently announced by the Star Drilling Machine Co., Akron, Ohio, is an all-steel drilling machine with 100 per cent anti-friction bearings, free-running reels, air cooled brakes and shockless spudder, and will drill up to 3,500 feet.

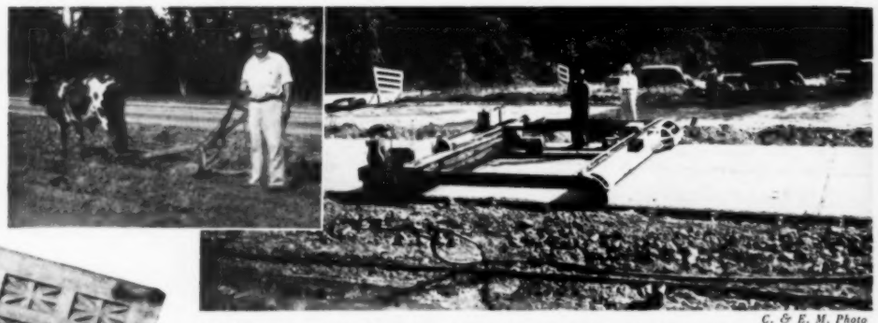
Designed as a portable drilling rig capable of fast moving and quick rigging up, it is of rugged construction, precision built, efficient in operation and dependable in action, according to the manufacturer. One of the features of this machine is the shock absorber for reducing the shock loads transmitted to the machine by the drilling line in order to protect the line itself as well as the machine.

Complete information on this Star No. 75 Spudrill may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item and magazine.

Contractors and Engineers Monthly

C. & E. M. Photos

View of the Recently Completed 8,800-Foot Sea Wall at Tampa, Fla., and, Right, the First Test Section of the Hand Rail with One of the Precast Spindles on the Ground. See Page 2.



C. & E. M. Photo

Left, In Contrast to the Modern Equipment Used by F. N. Thompson on His Concrete Paving Contract at Charleston, S. C., Is This Primitive Method of Planting Grass on Shoulders and Slopes. Right, the Longitudinal Finisher on the Job. See Page 11.

The Troy Special Road District in Missouri Uses This Willamette-Hyster Winch on a Caterpillar Twenty-Two Tractor and Sauerman Dragline to Remove Gravel from a Small Stream and Load It into Trucks for Use on Its Roads. The Outfit Handles About 30 Cubic Yards an Hour.

This Diamond No. 836 Rock Crushing and Screening Plant, Powered by a Caterpillar Diesel Engine, Produces 350 to 400 Tons of ¼ to ⅝-Inch Gravel Per 8-Hour Day. The Outfit, Owned by the Wyoming State Highway Department, Is Fed by an RD6 and RD4 Tractor and Scrapers.

An Economical and Readily Transportable Unit, Consisting of a Hough Loader Mounted on an Allis-Chalmers Model M Tractor, Used by Jefferson County, Arkansas, for Excavating Gravel in a Borrow Pit. The Outfit Excavates a Hundred Truck Loads of 3 Cubic Yards Each Daily.

An Unusual Use of a Caterpillar Diesel Tractor and LeTourneau Bulldozer for Unloading Dredged Material Taken from a Channel of the Columbia River onto the Barge. This Unit Unloads a 100-Cubic Yard Load in 40 to 50 Minutes. Puget Sound Bridge & Dredging Co., Contractor.

Top, It Looks Like an Explosion But in Reality Is a Bros Model CNW SnoFlyr and Model 16 Wing Mounted on an FWD Truck, (Shown at Bottom), Breaking Its Way Through Extremely Hard Snow and Ice in Wells County, N. D.

High-Speed Snow Plowing in Missoula County, Mont., Last February. This Adams Heavy-Duty Motor Grader with V-Plow Opened Up 200 Miles of Roads Last Winter, Encountering Many Deep Drifts.

A Section of the Aerial Map Which Proved Helpful in Establishing the Route of New Hampshire's New Highway to Canada. See Page 33.